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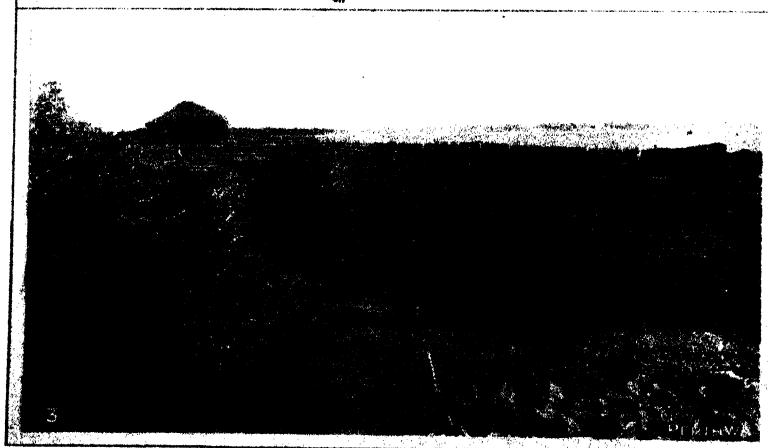
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JOURNAL
OF THE
Department of Agriculture
OF
WESTERN AUSTRALIA.

Vol. XVII,

JULY, 1908.

Part I.



Nangeenan State Farm.

1. Take-off pipe from Goldfields Water Main—for irrigation.
2. Flock breeding ewes, and clump of "Gimlet" gum trees.
3. Lucerne, under irrigation.

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NOTES.

Misprints.—Two typographical errors occurred in the spelling of names of the fodder grasses illustrated on page 452 of June *Journal*. In place of *Eragrostis Brownia* it should have been *E. Brownii*; and *Bromus Murginatus*, not *Brownii* M.

Agricultural Show dates.—At the expressed wish of the Narrogin Agricultural Society, the kindred society of the Williams District has agreed to alter the date of its Show to October 27. The Narrogin Show will therefore take place on October 29 instead of 30 as at first decided.

Mr. Hawter's System of Cold Storage.—The Melbourne *Fruit World and Journal of Produce* reprints the description of Mr. J. Hawter's method of cold storage of fruit at his Mullalyup orchard, which was given in the April number of this *Journal* by the Chief Inspector of Orchards. The editor appends this footnote:—"Is this not 'The Meakin System?' We congratulate Mr. Hawter on his enterprise."

Prussic Acid in Thistles.—The Chief Veterinary Officer of Victoria has reported that analysis has shown that thistles contain prussic acid similar to that contained in sorghum at certain stages of growth. In the samples analysed 14 grains of prussic acid were found in 1lb. of thistles. This would mean that from 50lbs. to 70lbs. of thistles would need to be taken to constitute a poisonous dose, but it is possible that greater quantities of prussic acid may be found in other samples.

Citrus fruit culture in the Victoria District.—Not long ago the Department of Agriculture, in one of its publications, described this district as the future home of citrus fruits. This contention receives ample confirmation when an orangery like that of Mr. Jupp, at Nabawah, is visited. Mr. Jupp's

trees are fairly loaded with the golden fruit. Both oranges and mandarins are sweetening rapidly, and for size and lusciousness would be difficult to beat. A pleasing feature of this garden is the absence of *aphis*, the pest that has such a hold on the orangeries along the Swan.—*Geraldton Express*.

Firing Drift-Sand.—Interesting and successful experiments (says the *Journal of Agriculture of S.A.*) have been recently carried out in the Woolundunga Plains, near Port Augusta, in country previously considered worthless owing to the drift-sand. It comprises an area about 20 miles long by seven to eight miles wide. The method followed has been to plough the land roughly with a 5-furrow plough, dropping out two of the furrows, and then sow with wheat, leaving the wind to do the harrowing. The result was a crop of wheat last year standing about 2ft. 6in. high, and saltbush also sprung up with the wheat. It is proposed to let the present crop sow itself and then use the land for grazing.

Insects in Stored Grain.—Anyone troubled with insects in grain stored in bins, or “shot” in the granary, may successfully deal with their extermination in a very simple way, as Prof. Ewart, of the Mississippi Experimental Station, has shown. This is done by sprinkling bi-sulphide of carbon. It kills by means of its fumes, and being liquid, and heavier than air, is easily manipulated. Simply sprinkle sufficient bi-sulphide on the top of the grain, and the fumes sink through to the bottom. This has been used at the rate of 1oz. of bi-sulphide to the hundred pounds of grain, or a pound to the ton; but experience has shown that a much smaller quantity will do the work.

Swine Fever and Quarantine Proclamation.—Consequent on the prevalence of disease among swine in this State during the latter end of last year, a large area, taking in almost the whole of the State, was declared (under “The Stock Diseases Act, 1895”) a temporary quarantine area. In the *Government Gazette* of the 19th inst., the declaration to that effect published on November 27 of last year is declared cancelled, and a new proclamation issued, which proclaims the temporary quarantine area as henceforth to be confined to portion of the Northam district only.

Successful Potato-growing.—The Department of Agriculture has received some very fine samples of potatoes grown recently at Logue’s Brook, near Yarloop, by Mr. T. Garlic. The specimens were taken from three acres, which gave seven tons to the acre, and were readily disposed of at £10 per ton. Among the finer samples were the kinds known as Carmen, Blissis Triumph, Factor, King Edward VII., Early Vermont, Pink Eye, and Manhattan. The Department has forwarded the samples to the West Australian Agency in Melbourne, where they will demonstrate the capabilities of this State for potato culture.

Cure for Potato Scab.—A cure for scab in potatoes is reported by the British Department of Agriculture as having resulted in Yorkshire from a dressing of wet sawdust at the rate of $2\frac{1}{2}$ tons to the acre. The official report says:—“Many authorities attribute scab to a fungus; and if this is correct, the beneficial effect of sawdust may to some extent be due to the protection which a covering of this material affords the tubers against the

attacks of the scab-producing fungus. The sawdust was first steeped in water and then applied on the rows at planting time over the sets and before the ridges were split."

Importation of Eggs.—The quantity of eggs imported into Western Australia from the Eastern States during the present year up to end of May was 579,123 dozens, valued at £29,042. During the corresponding period in 1907, the figures were 683,723 dozens, valued at £31,124. This decrease of over 104,000 dozens gives an indication that the poultry industry is making headway in this State, and there is promise that at no distant future we shall be able to supply local consumption with our own products and retain the large sum of money represented above for the producers of Western Australian eggs.

Pruning Competition.—The annual pruning competition, under the auspices of the Wellington Agricultural and Pastoral Society, took place on June 20, in Mr. Ecclestone's orchard, Boyanup. Mr. J. Hawter acted as Judge, and there was a good attendance. There were five entries for the Championship Cup, which was won by Mr. R. Ecclestone, with 99 points. The amateur competitions resulted as follows:—Vines: J. Ecclestone, 47½ points, first; Percy Smith, 44 points, second; Peaches: P. Smith, 23 points, first; Joe Ecclestone, 22 points, second; Apples: Joe Ecclestone, 25 points, first; Percy Smith, 22 points, second. Mr. Hawter, speaking on the value of the competitions, laid stress on the importance of pruning to make fruit-growing a success.

Prevention of Wheat and Barley Smut.—The use of copper-sulphate (bluestone) has been known for many years. It consists in immersing the seed for one or two minutes in a solution prepared by dissolving 1lb. of commercial copper-sulphate in 5 gallons of water, and then putting the seed for five or ten minutes in lime-water made by slaking 1lb. of lime in 10 gallons of water. This treatment is cheap, easily applied, and very effective. The treatment of seed with various strengths of formalin has of late years been the subject of much experimental investigation, and it has been found very valuable for the prevention of various smuts. It is recommended to be used at the rate of 1lb. to 50 gallons of water. The seed should be soaked in the solution for about ten minutes, care being taken to keep the grain well stirred so as to increase the thoroughness of the application.

Transmission of Tuberculosis.—Mr. Gilruth, New Zealand Government Veterinarian, recently gave a startling instance of how tuberculosis may be transmitted from affected cows to pigs through the medium of skimmed milk. "It was in August last," said Mr. Gilruth, "that I examined a dairy farmer's herd of 40 cows. There were 21 suffering from tuberculosis. About the same time I examined 60 pigs belonging to the same farmer and found 39 were affected. Two or three days later I examined another 100 pigs of the same man and 60 of them were tuberculous. None of the pigs were over nine months old. A few months later I again went to the same farm and found another lot of 50 pigs had become affected." All this, he said, served to show that there should be a law, as in Denmark, enforcing the sterilisation of skimmed milk, on which, presumably, the pigs had been fed.

Animal diseases in the Philippines.—The *Agricultural Review of the Philippines* for March is devoted to the subject of common dangerous communicable diseases of domestic animals in those islands, and the best means to adopt for their prevention and eradication. The editor, commenting on the question, declares it is the most vital one affecting the welfare of farmers in the islands, the ravages of rinderpest and surra being generally known, and that "from one end of the Philippines to the other those diseases have destroyed thousands upon thousands of work animals, in many sections agricultural development has been paralysed, the country suffering incalculable losses." In October, 1907, the Philippines Commission, by authority of the United States, "enacted a law to prevent the introduction of dangerous animal diseases and their spread within the islands."

How to prepare Tea for drinking.—Attention is drawn in *Tropical Agriculture* to the fact that ordinarily tea is not drawn properly, which not only makes it less palatable than would otherwise be the case, but also makes it very deleterious. Chemically, tea leaves yield principally thein and tannin. The former is the mild stimulant that is sought, while the latter should, as far as possible, be avoided. The thein is soluble, and nearly all dissolves in water that has been brought to the boiling point and allowed to remain on the leaves three or four minutes, whereas if the infusion be longer extended only a little more thein is extracted, but much more tannin. To make tea properly, bring freshly drawn water to a boil, pour it on the requisite amount of tea in a previously scalded pot, and allow it to remain covered from three to four minutes; then decant or strain into another receptacle. The spent leaves should not be used again, because practically all the stimulating ingredient has been removed and that which is left is very deleterious to health. The information is of particular interest to the vast army of tillers of the soil who find in tea a valuable corrective to water sometimes of questionable quality.

Emigration from Britain.—The *Colonizer*, a London journal published in the interest of emigration to the Colonies, contains a great number of inquiries about the various over-sea dominions from intending colonists to whom the editor supplies much useful, guiding information. The following is a specimen of the kind given to those who are casting their eyes in the direction of this State:—*Fruit Growing* (F. E. H., Bournemouth).—Western Australia, we think, affords you the best opportunities for fruit growing. Before taking up land on your own account, however, it would be necessary for you to serve for at least one year, if not longer, on a farm as a hired hand. Naturally, being inexperienced, you would not command a large wage at first, but if you showed industry and application your rate of remuneration would increase accordingly. The soil and climate of the south-western portion of the State are especially suitable for fruit growing. Apply to the Agent-General for Western Australia, 15 Victoria Street, London, S.W., mentioning our name; he will be pleased to give you all the information in his power.

Royal Agricultural Society's Show.—The schedule of prizes for the Royal Agricultural Society's annual exhibition, to be held on 29th, 30th, and 31st October, and 1st and 2nd November next, has been issued. The prizes offered total £1,600, subject to any alteration the Committee may deem necessary. Attention is drawn to the Champion Prizes in the sheep classes: the

names of breeds to which the Society's certificate and ribbons will be awarded being enumerated, and in the section, rams of any pure breed, a first prize of £10 10s., with a second of £5 5s., being offered. In Section K—Agricultural Produce grown in W.A.—the prize money is £26 10s., and in Section L—Dairy Produce—a total sum of £13 10s. is set aside for prize money. Prizes in Section P—Floriculture—will absorb £58 5s.

Testing "High Class" Guano.—(a.) Colour—Should resemble that of coffee and milk. If too grey, it is earthy; if too brown, it contains an excess of water. (b.) Taste—Strong, salt, piquant, caustic. (c.) Smells strongly. Varies with degree of dampness. The strong smell of damp guano is due to carbonate of ammonium. (d.) Consistency. Oily to the touch. In small grains, though sometimes adhering in large pieces. If rich in urates, will appear shining and crystallised when broken across. (e.) Flame—Will blaze up quickly, if good, and leave residue of charcoal ashes. There is less charcoal in guano poor in organic matter. (f.) Mixed with quicklime, ought to give strong evolution of ammonia. (g.) Weight about 60 to 70lbs. per bushel —(*Agricultural Notebook*.)

Potato-ring, or Brown-rot.—The following information on this disease of the potato, taken from the South Australian *Journal of Agriculture*, will, probably, be of value to farmers in this State. The potatoes appear firm and sound when dug, though some show a slight discoloration on the surface; if stored for a time, a dark, irregular ring shows a little beneath the surface. The varieties in which the disease has been noticed are Prolifics and Warrior. Beauty of Hebron is very liable to this disease, and a change of seed is strongly recommended. The land on which the affected potatoes have been grown should not be put into potatoes again for two or three years. The disease shows first in a wilting of the leaves, the veins of which take on a darker colour than usual, and soon the whole plant becomes affected. If the diseased stems are cut, a discoloration of the tissues is observed; the bacteria reach the tuber through the stem, and the stem end shows indications of the disease, while the tuber is apparently quite sound elsewhere. On cutting the tuber a brown or black discoloration of the tissues will be seen; this gradually increases and ultimately complete rotting is the result. It has been proved that the disease is transmitted from plant to plant by the agency of leaf-eating insects. Bacteriosis, or brown rot, appears to be more or less common in all potato-growing countries.

Varieties of Wool.—The varieties of wool produced in British Colonies are thus described in a bulletin of the Imperial Institute:—There are three varieties of wool commonly produced: (1.) Long—"English" or "Lustre" wool. (2.) Short—"Botony" or "Merino" wool, also English Down wool. (3.) Medium "Cross-bred" wool. The description "English" is applied to the long wool produced by Lincolns and other similar breeds of sheep. This is a lustrous wool of good strength, from six to ten inches long, with a diameter of about 1-600th inch. It is white and silky and of good colour. Owing to the scale structure being only slightly developed "English" wool does not possess the felting property referred to above. "Australian Merino" ("Botony") wool may be considered as a typical felting wool. Owing to the scale structure being well developed, this variety has not the lustrous, silky ap-

pearance of the English wool. It is short, having length from one to three inches and a diameter of about 1-200th inch, and is extremely soft and fine. The best "Merino" is capable of being spun into very fine yarn, and is the most valuable wool produced. "Cross-bred" wool is produced by cross-breeding "Lincoln" and "Merino," or short-wool sheep. In some cases "Cross-bred" wool has most of the properties of the "Merino"; that is, it is short and curly non-lustrous, and a good felting wool; and in other cases it more clearly approaches the "long" English wool.

Western Australian Grapes.—The following appeared in the *Weekly Times* (colonial edition) of May 22, 1908, which is of interest to fruit exporters to London:—"The new shipments of grapes from Western Australia have attracted special attention from fruiterers in the Midlands from the fact that they are more suited for distribution amongst Midland consumers than they are amongst the public in the South of England. The latter are content to buy the higher-priced home-grown new grapes now on sale, or the old English grapes which are now scarce and higher-priced than the colonial samples. We are informed that the shipments can be made freely in future seasons, and that the supplies can be extended readily to meet almost any demand, provided satisfactory prices are maintained. Inquiries indicate that the grapes would secure the best demand and sale if packed in uniform-sized boxes containing within 10lb. or 12lb. of fruit each. A package containing a quarter of a hundredweight of fresh grapes for marketing in May is far too heavy for the bulk of retail fruiterers. It is estimated that extensive shipments can be dealt with by the trade if it will pay exporters to put the fruit upon the English markets at from 9d. to 1s. per pound. The fruit is now retailed from 1s. to 1s. 6d. per pound, at which prices the demand is good. Much will depend upon the grade of the fruits sent, but with care in selection, packing, and shipping, there is every prospect of a large and satisfactory trade being developed in this country by the sale of Western Australian grapes."

PUBLICATIONS RECEIVED.

- Transactions of The Highlands and Agricultural Society of Scotland, Vol. XX.
 Journal of Economic Entomology (Concord, N.H.)
 Meteorological Observations, W.A. 1906.
 Twelfth Report of Royal Commission on Horse Breeding (Imperial).
 Report on Diseases of Cocoa-nut Palms in Travancore.
 Volumes I., II., III., V., VI. Transactions College of Agriculture of Portici, Naples.
 Milk Commissions and Certified Milk (U.S. Department of Agriculture).
 Regulations for Meat Inspection (U.S. Department of Agriculture).
 Census of New Zealand, 1906.

THE MINISTER'S TOUR OF AGRICULTURAL DISTRICTS.

During the month the Minister for Agriculture paid an official visit to agricultural districts on the east of the Great Southern railway. He arrived at Wagin on July 2, and was given a municipal reception at which, in the course of his address, he referred to the proposed extension of the Dumbleyung railway, expressing his thorough belief in railways as a means of developing agricultural districts. Mr. Mitchell said the State was on the eve of a similar awakening to that which Argentine experienced. The potentialities of Western Australia were incalculable, and it was encouraging to know that the State was progressing on right lines of agricultural development. Referring to the importance of cold storage for the fruit and lamb industries, he explained the intended scheme for establishing freezing works at Wyndham, and the benefit the State would derive from them.

On the following day the State farm at Narrogin was visited and several hours occupied in inspecting the crops and property. At the reception in the Town Hall in the evening, the Minister, in responding to the toast of "The Ministry," said there was no reason why, in the near future, Western Australia by its agricultural developments should not be known as the greatest of the Australian States. He pointed to what the Government was doing for the settler on the land by the liberalisation of the Agricultural Bank, importation of breeding ewes and dairy cows, erection of silos, special settlements for people already in the State, and by the construction of agricultural railways and spur lines. In respect to railway freights, the Government recognised the necessity for placing the exporter of produce on an equality with competitors in the Eastern States.

The Ministerial party left Narrogin on Friday, July 3, and drove through excellent country to the Jewish Settlement, which was inspected to the Minister's satisfaction. About fifty settlers assembled in the evening at the residence of Mr. Clifford to welcome the Minister, and he was waited on by a deputation asking for various benefits for their district. On the following morning Mr. McBurney's fine farm was visited, *en route* to Cuballing, and back to Narrogin, where Mr. Mitchell took train for home.

The trip was regarded by the Minister as most informative; it was astonishing to see such an area of magnificent land under cultivation and the amount of clearing which had been effected by new settlers in the short space of six months: proof of their courage, industry, and enterprise. Mr. Mitchell derived particular pleasure from his visit to Mr. McBurney's farm, which has been established only six years. Everything was substantial and well built, the outbuildings being of a solid permanent order. Stables and barn are entirely of stone, and wheat and oats are stored loose to prevent loss by mice and other pests. The horses are truly splendid animals. All the improvements are highly creditable to Mr. McBurney.

AGRICULTURAL INDUSTRIES ON THE GOLDFIELDS.

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The Under Secretary, Mr. A. Despeissis, visited the Eastern Goldfields in the early part of the month, and was deeply impressed with the growth of many important productive industries which has taken place in those inland districts, despite the supposed unfavourable climatic conditions met with in that part of the State. Describing his tour of inspection, Mr. Despeissis thus spoke of—

DAIRYING.

“To supply the demand for milk, several large dairies have been established around Kalgoorlie and Boulder. Time permitted one only of these establishments being visited, and an hour at Mr. Sparling’s dairy made me regret I could not see the other dairies. Mr. Sparling milks at present 90 to 100 cows, and runs on saltbush and grass outside another 150 odd cows, which are brought in when near calving. The cows are of mixed description, no systematic record is kept of their milking capacity, but any animal which is not apparently a money-earner is fattened off and sold. The heifer calves are reared, and at the time of my visit a fine Shorthorn heifer, reared at Kalgoorlie, was in the yard with a newly-born calf at foot. She had been for some time turned out into the bush, and was in very good condition. The cows are of all strains, and they are mated with Shorthorn bulls. They are milked in the early hours of the morning and again about midday, in order to deliver fresh milk for breakfast, and also early in the afternoon. They are fed on chaff, steeped for some hours in water, with some bran and polard subsequently added. The feed bill has been unusually heavy lately, and has run up to as much as £150 to £200 a month, but since the rain caused the trefoil and grasses to grow, the daily ration has been reduced, and also the heavy cost of feeding. Besides the milch cows, 16 delivery horses are also stabled and fed. Both stables and cowsheds, milkrooms, and other buildings are kept in a cleanly state, and are frequently visited by inspectors of the Stock Department and of the Central Board of Health, who see that all health and hygienic requirements are observed. An abundant supply of water from one of the adjoining mines runs down by gravitation, and is accessible to stock at any time; a good deal of water is also used in washing milk cans, floors, and flushing gutters. This water is conducted to a garden, under the charge of an experienced gardener. There it is distributed over a well-cultivated vegetable garden. Such delicacies as mushrooms and also flowers are not overlooked; also fruit trees, mostly stone fruit, which on the goldfields do remarkably well. One corner of the garden is devoted to lucerne and green crops, for such stock that now and again require special attention.

PIG BREEDING.

“During my flying trip to Kalgoorlie Mr. Glen, Inspector of Stock, gave me an opportunity of visiting some of the largest piggeries and dairies in the State. At Messrs. Black Bros.’ piggeries, 2,500 pigs are kept. The piggeries are situated on sloping ground; they consist of 15 yards, and of

120 sties for the accommodation of brood sows and their litters. The pigs are both bought from the coastal farming districts and bred at the establishment, where 400 brood sows are kept. The labour problem has here been handled with remarkable results. Two men only attend to the feeding of the pigs and the cleaning of the yards, and three drivers with tank carts collect from hotels, restaurants, and breweries all the refuse available. This, supplemented with pollard, is poured into capacious shallow tanks and pits provided along the alley-ways which intersect the three or four acres of piggeries. The stuff is then bucketed out of these pits into the troughs in the breeding pens, or the pigs are allowed access to the shallow tanks which each serve four or five yards containing 60 to 100 pigs. Those pigs nearer selling condition first help themselves when they are driven to their yard, and store pigs of various grades then come in in succession, while the brood sows without litter and with a tendency to running to fat have the last helping. Thus thinned of the more nutritious portion, the liquid is run along wooden fluming to fatten land under barley and wheat crops adjacent to this mammoth piggery.

"Mr. Harvey's piggeries were also visited, and 1,000 well-fed pigs inspected. Mr. Harvey breeds most of the pigs. For that purpose he keeps 200 brood sows and several good boars of the Berkshire, Large Black, and Large Yorkshire breeds. Each sow rears five litters in two years; the average of pigs reared is about six per litter; they are kept until they are about eight years old. The piggeries consist of 70 breeding sties and a number of yards, each holding 50 to 70 pigs of different grades. Here, also, labour is minimised; two men feeding and cleaning, with three others carting hotel and restaurant and brewery refuse, do all the work and keep the place in the sanitary condition which conforms with the high standard laid down by the Local Board of Health. Some 50 pigs a week are sold to the butcher, most of them porkers, 60lb. to 65lb. weight, and about four to five months old. Mr. Harvey feeds greenstuff grown at the piggeries, wheat, pollard, and hotel refuse, at an average cost per week of 14d. per pig. The pens are made of sheet-iron from cast-away 400gal. iron tanks, which afford protection against the driving wind of the goldfields. Shelter sheds, with dry litter, are provided in each yard, and afford protection against the scorching sun. It would take a score or more such establishments to supply the £126,000 worth of pork, ham, and bacon imported annually to this State.

GOLDFIELDS ABATTOIRS.

"Again, in company with Mr. Glen, I made a visit of inspection to the public abattoirs now in course of construction a few miles out of Kalgoorlie and Boulder. The yards and buildings are completed, and a portion of the machinery is now on the ground. These abattoirs will serve the requirements of a population of 30,000 to 40,000 people. Mr. Cairns, the superintendent of abattoirs, has designed them in conjunction with the Government architect, and the structure embodies the best features of abattoirs in Australia. Cattle, sheep, and pigs will, on arrival, be drafted into yards which contain automatic feed and water contrivances. After a rest there they will be quietly walked into the building, where they will be handled by skilled slaughtermen in as expeditious and humane manner as possible, when they will be handed over to their respective owners and wheeled on overhang-

ing rails to the cooling shed, where in the summer electric fans will create an artificial draught. After being properly cooled, the carcasses are conveyed into the butchers' carts, which line up against an adjacent platform. The offal and skins are in the meantime conveyed to other parts of the abattoirs; the cattle skins are salted and folded up on a cement floor, and the sheepskins dressed and hung up to dry in yards and well-ventilated sheds. The designer has provided six sets of yards, slaughtering and cooling pens, and skin yards to accommodate the requirements of as many butchering firms, which will thus keep their carcasses separate.

"The offal, blood, and refuse are from the hanging gallows conveyed in iron trucks in the desiccator to be dried and deodorised, and what is now a waste will thus be turned into manure, which, if one can judge by the developments agriculture is making on the goldfields, will all be utilised locally. This is not all. All the washing from the cement floors will be conveyed into settling tanks, where the floating fat will collect, and will be conveyed to the boiling-down tank, while the water charged with fertilising material will stream down a flume on to the rich land below the abattoirs, and be utilised to irrigate vegetables or fodder crops. Tallow will also be saved, and run into casks.

"I think these goldfields abattoirs will be the first of many such establishments where fat stock will be conveyed, rested, and slaughtered, and treated under official supervision by a skilled staff. The designers have not been unmindful of the safety of the operators. Man-escapes, overhead footboards, and a well-thought-out system of drafting gates and gangways will reduce accidents, and banish from these abattoirs any spectacular incidents suggestive of a Spanish bull fight.

WHEAT CROPS.

"In the immediate vicinity of Kalgoorlie some fine patches of green stuff were seen. I was informed that for some distance out some larger fields had been sown, but an appointment at Coolgardie did not permit me to have a look at them. Around Coolgardie I ascertained that there are this season about 300 acres under cereal crop, mostly wheat. Messrs. Bow Bros. and D. Gunn have each 80 acres, Messrs. Harvey and Colley 22 acres, the Hampton Plains Company 20 acres, Messrs. B. Scales and Collins 70 acres, and others small plots. This season has been particularly favourable for crops on the goldfields. The Coolgardie *Miner* of the 2nd published the registered rainfall to June 30, which was 797 points, as against 853 points for the corresponding period of last year. I must confess to being little prepared to see such luxuriant crops as some of those at present growing on the fields. Three years ago I had seen an 18cwt. crop of wheat at Kanowna, since then the area of land under wheat has steadily been increased. Messrs. Bow Bros., carriers at Coolgardie, kindly gave me some information regarding their past experiences in raising crops on the fields. They have for the last five years cropped four 20-acre blocks, leased under the Goldfields Act. They have only once experienced a total failure, and this, in spite of methods which in better favoured wheat areas would be considered extremely risky. The land was cleared four years ago of the stunted gum and scrub, at a cost of about £1 per acre; the ground was fenced; ploughing is done when work is somewhat slack about December, and the crop sown broadcast, and without any fertilisers, in March. The seeds are of no

particular kind, the order to the Northam produce firm being for some good milling wheat. One and a-half bushels are sown to the acre, and judging by the thickness of the crop few seeds failed to germinate. The average crop last year was 18cwt. for the 80 acres. I have little doubt that by means of winter ploughing and sufficient summer cultivation of the fallow land a crop of some early wheat, as Alpha, Australian Crossbred No. 73, Baroota Wonder, drilled in at a uniform depth with some superphosphate of lime, would yield returns undreamt of a few years ago for such a locality as the Eastern Goldfields. So impressed are Messrs Bow Bros. with the result of their five years' experience that they have just a few days ago applied for a 480-acre lease, a little over two miles from Coolgardie. Portion of this land they will proceed to clear at once, and hope to have 40 acres under oats before the end of July. A better course, to my mind, would be to follow the Eastern District wheat-growers' practice, and fallow that land for next year's cropping. Whatever they decide to do, however, they will reap either a profitable crop or valuable experience, which will be of much benefit, alike to themselves and others on the goldfields who are now turning their attention to the cultivation of some of the best land to be found in Australia. The rearing of a variety of wheat which will ripen its grain even a couple of weeks in advance of our modern days early corn, would alone unlock for wheat-growing millions of acres of some of the richest land in the drier interior. There is no doubt that dry farming under such methods, which have been followed with success in other parts, is likely in the near future to transform into cultivated fields a large portion of that vast stretch of good land served by the goldfields railway and the goldfields water pipe, extending from the present outposts of farming this side of Southern Cross all the way up to the Eastern Goldfields."

ADVANTAGE OF DRAINING AND DEEP PLOUGHING.

The following are particulars of an experiment carried out on a farm and published in the *Mark Lane Express*. They should prove instructive to our farmers.

A field was divided into three parts, of which one part was left undrained, another part was drained, and the third part was not only drained but the soil loosened to some depth by deep ploughing:—

Yield per acre.	I.	II.	III.
Number of sheaves ..	834	894	1,092
Grain—lbs.	1,190	1,530	1,950
Straw—lbs.	5,450	6,700	8,223

which show clearly what great advantage in some cases may be derived from drainage and ploughing.

ANTIDOTE FOR POISONED STOCK.

By E. A. MANN, Agricultural Chemist.

The method of treating stock poisoned by eating our native poison plants, which was the outcome of research work carried out in the Government Laboratory in 1906, has now undergone fairly extensive trial. Altogether 7,500 doses have been distributed free of charge to settlers in various parts of the State, and recently a number of reports have been received as to the results achieved by its use.

The antidote is made up in tabloid form in small bottles containing 25 tabloids, each equivalent to the dose for a sheep, and full printed directions for use accompany each bottle.

The tabloids contain two chemicals, one of which is similar to the ordinary Condry's Crystals, and in many letters it has been stated that farmers are using Condry's Crystals themselves for treating poisoned stock.

Where no tabloids are available the use of Condry's Crystals are certainly to be recommended, but it is desirable to remove the impression that the tabloids distributed by the Department are only Condry's Crystals in another form.

There is no doubt that the tabloids would be more effective than the Crystals, and I would strongly urge all farmers who are likely to meet with trouble from the poison plants to keep a stock of the tabloids by them since they cost them nothing, and are very easy to carry about and to apply.

I thought it might be of interest to the farming community to reproduce the following extracts (condensed in some instances) from a number of letters recently received. In these extracts I have only reported the cases in which the tabloids have been used, and have omitted those dealing with Condry's Crystals, though there are several of the latter also reported. In a few cases failures are mentioned, but in every case where a failure has occurred there has been some obvious reason for non-success, and in order to prevent this I would like to say here that once the animal has been treated and indeed at any time after it has been poisoned it cannot be kept too quiet; to move the animal about, to let it run loose with other stock, or to worry it in any way at all will decrease its chances of recovery.

Another point which farmers seem slow to understand, although it is emphasised in the directions issued, is that a single dose may not be sufficient; frequently an animal will show some slight signs of recovery after a single dose, or even recover altogether, but in other cases there may be a large quantity of the plant in the animal's stomach, and although the first dose may show little or no improvement, further doses will have the desired effect. They should not be given in this case at too long an interval. An hour after the first dose a second may be given, and if the case is urgent half a dose may be given after the next half hour. If the animal has taken a large dose of poison it would be well to repeat the dose in any case, for after the first stage of recovery further absorption of the poison may take place from the food in the animal's stomach, and if it is left at that stage it may still die.

It is very gratifying to learn that though this antidote was first devised for the York Road poison, Box, Heart Leaf, and Blind Grass, as well as York Road, are mentioned in these reports, so that there is no doubt that it is generally applicable to all our poison plants.

In the letters from which the following extracts are taken there are numerous references by the writers to cases of successful treatment which they have heard of amongst their neighbours. None of these hearsay cases have been included, but they indicate that this method of treatment is becoming fairly widespread.

Excerpts of Letters received from Farmers and others who have used the Antidote for Poisoned Stock supplied by the Government Analyst.

Mr. H. B. Harvey, of Barton, states:—

"The number of sheep (5) poisoned with Box Poison, treated with the antidote, all recovered." (Mr. Harvey also reports four failures, which were accounted for by special circumstances.)

Messrs. L. & R. B. Taylor, in a letter dated 27th January, 1908, state:—

"We are pleased to be able to inform you of the good results obtained by using the tabloids which you supplied us with. When on the road from Beverley to our Peakaring place (48 miles east of Beverley) my father was called away and left a flock of sheep in charge of a man. On his return he found 30 of them poisoned. These were immediately put in a dray and taken to the homestead, treated with the antidote, and speedily recovered, with the exception of one, which jumped out of the dray; on returning for this we were surprised to find it already dead. It is almost certain that they would have all died if they had not been treated with the antidote."

Mr. C. E. Hennessy, of Yenart, writes:—

"I have tried your tabloids on two sheep, which had eaten York Road poison, and one tabloid each cured them in a very short time. One horse, valued at £60, was also treated with two tabloids and was cured."

Mr. C. J. Moran, of Tamacurring, East Wagin, states in a letter of 15th February, 1908:—

"In several cases of sheep poisoned I have effected a cure with one dose of the tabloids."

Mr. Wm. Thomas, of Ethelvale, Kuyabing, writes:—

"Have received the antidote. Gave the horse (which had taken poison) a dose, and it is better."

Mr. W. H. Sheridan, Broomehill, reports:—

"I have had occasion to use the tabloids on a cow that showed symptoms of poisoning. I administered the tabloids as directed, and next morning the cow had recovered. Since the above-mentioned occurrence I have had another cow poisoned, but having sent the tabloids out to my farm, I could do nothing, and she died within a few hours."

Mr. H. Lockton, of Narrogin, states:—

"I have used the antidote for poison with very good result. I had a mare sick through eating Box poison; she refused to walk to my home about half-a-mile. I gave her one dose of one and a-half tabloids; the next day she was all right."

Mr. I. Rintel, of Montrose, New Jerusalem, states:—

"I have used the tabloids on three sheep—two recovered, one died. I consider they had poison eighteen hours before I noticed them. The first treated got better after two doses, the second, after one dose.

Mr. Phillip J. Toll, of Wagin, writes:—

"I lost about 20 sheep last spring through eating York Road poison, but was only fortunate in finding one alive in time to dose it with the tabloid supplied. It could run only a few yards when it would stiffen out and shake, and I thought it beyond hope, but it recovered in about eight hours after being dosed with one tabloid in about a pint of water." (Mr. Toll also reports a case of a foal which, after distinct signs of recovery, was allowed to run loose before completely cured, with fatal results.)

Mr. S. A. Pennington, of Tatiara Farm, writes:—

"With reference to your antidote, I am pleased to state that it has been most successful. I have tried the antidote on 20 sheep, and some of them so bad that it was with difficulty that they swallowed the medicine, but in all cases they recovered in the course of a few hours. I also tried the antidote on one cow with the very best result. I have no hesitation in saying that the antidote is most valuable, and the greatest boon to the stock-raiser yet introduced into this country."

Mr. E. Ebsary, of Wagin East, reports:—

"I had one of my sheep poisoned with York Road poison. I gave it one tabloid in warm water. It was all right in a few hours."

Mr. C. G. Wood, of Wagin, writes:—

"I have used some of the tabloids with satisfactory results. A neighbour of mine had a horse (13 years old) bad from York Road poisoning. It was dosed with 1½ tabloids in one pint of water. In two days all outward signs of poisoning had disappeared, and the horse is now working. I considered one mare of my own bad from Box poisoning lately and dosed her with one tabloid in one pint of water. She is now quite well."

Mr. A. Levitzke, of Tambellup, writes:—

"Since receiving the remedy from you I have had three cases (horses), and in every case it proved an undoubted success.

"The first horse I had poisoned got out of the paddock one night, and in the morning I found him on a burnt poison patch, and there was every indication of his having eaten a large quantity of the deadly shoots. Before I got him home I could see the symptoms in the glassy eyes, and the trembling behind the shoulder blades, and the sluggishness of his action. I hardly got him home before he collapsed. I immediately mixed the tabloid in half a pint of warm water, when thoroughly dissolved I added one pint of cold water, and gave as a drench, and in about two hours the horse seemed much easier. Two hours later I came back to him and found him walking about, and next morning he was feeding. There was evidence that the drench had done its work well, and within 24 hours there was no sign of the poison left. I worked him (steady work) 48 hours after, and he seemed as well as ever, and has not been bad or shown any ill effect of the poison since.

"The second case was a horse running on poison country, and the general rule is never to work a horse that has been grazing on poison lands for at least four or five days, but I wanted to plough a fire-break and was one horse.

short, so that I chanced breaking the rule, with the result that I found my free-puller lagging behind before I had gone half-a-mile. I immediately looked for the usual poison symptoms, found them, hurried him home (at the rate of about one mile an hour, the usual pace of a poisoned animal), and gave him the drench as in No. 1 and left him until night, when all the signs seemed to have left him. The following day, *i.e.*, 24 hours after the first symptoms, I worked him and noticed no effect of the poison then or since, so that satisfied me for the second time how effectual the remedy was.

"The next case was a brumby that I had running on poison land. Always a very spirited animal, on this occasion the contrast was very marked, and there was no need to look for any symptoms, he simply staggered along wet with sweat, although I only had a short distance to go. Within an hour after giving the drench, I could get him to walk about, and next day, *i.e.*, 12 hours after the first symptoms, he was as well as ever."

Mr. W. H. Shields writes:—

"I had a horse brought in from the team scarcely able to walk and showing symptoms of acute 'Box' poisoning. I administered a drench through the nostril—very shortly afterwards the animal broke out into a profuse sweat, which ran from the body in regular trickles.

"A few days later the animal was again working in the team none the worse for his experience"

Mr. W. J. Haines, of Burracoppin, writes:—

"I have used the antidote on four occasions. In two cases they were successful, and two not, the latter cases, I think, were too far gone. In all four cases the animals were goats. I kept the antidote in solution in two beer bottles—one tabloid in each—and on noticing the symptoms (huddling in the corner, refusing to eat, and a general disinclination to move, later frothing at mouth and trembling). I gave the first dose (one bottle). About two hours after use I noticed a slight improvement, and gave a second dose; the following morning they were feeding with the flock. I have now my stock fenced off from the poison. Thanking you for sending the tabloids, and I think the thanks of the farming community are due to you for your researches and experiments in finding this cure for poison."

Mr. A. J. Harstedt, of Wickepin, writes:—

"I drenched a 4 year old gelding with 1½ of the tabloids for poison, with good result. The animal had quite recovered in about a week."

Mr. J. Ladyman, of Katanning, writes:—

"I noticed a sheep in the flock blown out and frothing slightly at the mouth, had to drive the flock a quarter of a mile to yard. I drenched the animal with one tabloid in a pint of water as directed. The sheep appeared to be decidedly worse, froth hanging from the mouth, the stomach also being distended to an abnormal size. Drenched the animal again with one tabloid as before. Sheep looked much better, and I decided to let it out of the yard. It appeared to be uncomfortable for a time, but afterwards joined the flock recovered from the effects of poison."

Mr. F. Hillman, of Elgin Siding, writes:—

"I am sorry to say that I have not been able to give the antidote a fair trial, other years I have lost some of my goats just after the bush fires, but this year only one was affected. I gave the animal one dose of the antidote and she has quite recovered."

Mr. Austin Bastow, of Kojonup writes:—

"It is now some months since I received the antidote from your Department, and I have had occasion to use it many times, with varying results.

"I am satisfied from my experience that if I can get hold of a sheep suffering from the poison plant without unduly exciting and causing it to run about, the tabloids will cure it in *every* instance. I have used the antidote probably twenty times on sheep, and out of that number probably saved 18. Unfortunately sheep when poisoned generally go off quietly and die, but if found in time I can always, or nearly always, save them.

"I had a horse poisoned through eating dry poison a couple of months ago, he was lying down and kicking in convulsions when I found him. I was afraid I was too late, but rode home and got the antidote and gave him two tabloids in a whisky bottle of water; I left him then for an hour and then came back and found him much relieved, so I gave him another tabloid, in about half an hour he came strolling along up to the house, feeding along the way and showing no signs of his recent trouble.

"I would be much obliged if you would send me a further supply of tabloids; I have no doubt I shall need them very shortly as the dangerous time for York Road poison is rapidly approaching again."

IMPORTED SOUTH AFRICAN FODDER.

A correspondent, with extensive experience of stock in foreign countries, informs us that there is a probability of grave damage attendant on the importation of fodder from South Africa. The latter country is noted for virulent stock diseases, including the dreaded rinderpest, Russian plague, and others. Rinderpest cost England £10,000,000 between 1865-7, and other countries also suffered severely at various times. The most rigorous efforts were necessary to stamp out the disease. Stock were destroyed, deeply buried, and also fodder and other things they came in contact with. The advent in Australia of any of the cattle diseases prevalent in Africa would be a national calamity, and for that reason the closest supervision should be maintained. Importing fodder from unknown districts in Africa, which may have been highly infected, and which by diminished herds from disease would produce abundance of fodder, either naturally or by cultivation, is a highly dangerous practice.—*The Farmer and Grazier*.

According to the *Australasian*, the Victorian State authorities are now considering the propriety of including ripened grain in the list of articles whose importation into Victoria from South Africa is forbidden by regulations. At present ripened grain, such as oats, is not on the prohibited list. The reason that in the past chaff has been prohibited while ripened grain has been admitted, is that chaff was considered to be a likely vehicle for the introduction of South African stock diseases, while ripened grain was regarded as harmless.

VETERINARY EXAMINATION OF HORSES AT SHOWS.

— — —
R. E. WEIR, Chief Inspector of Stock.

This subject has recently been brought forcibly before the public by reason of the Royal Agricultural Society having the matter under consideration, and the acrimonious discussions which followed in connection therewith. A few of the more practical members deprecated any action being taken in this direction, believing themselves to be quite as capable as the most expert veterinarian in offering an opinion upon soundness. Without in any way reflecting upon the capabilities of those gentlemen, it is gratifying to know it was from a totally different standpoint that the Committee in their wisdom decided upon postponing the discussion. When consideration was being given the question it became evident that the best results could not be obtained in connection with shows alone, and the matter was consequently left in abeyance until a more satisfactory solution of the difficulty could be propounded. Those interested in breeding must concur in the action thus taken, as the cardinal point in connection with the proposal would be the examination of sires, and those particular animals are busy with their season's engagements when shows are usually held. It is therefore obvious that only a limited number can be shown, and thus the good intentions of the Society would be frustrated; moreover, it is possible that examinations could not be carried out at some of the minor shows and that those rejected animals would come in competition with sound ones, leading to serious friction. Although these disabilities are to be met with, the Society should not shirk the responsibility, which is undoubtedly theirs, of formulating a scheme which would have for its object the elimination of all unsound sires and a consequent improvement in horse-breeding.

That some workable project can be arranged is quite possible, and no delay should occur in arranging a programme for same. In my opinion the most practical method would be the holding of an annual exhibition of sires during the off-season, and to ensure its success good substantial prizes should be provided in each class; one of the conditions of the competition being the holding of a certificate of soundness by each individual animal, such certificate to be signed by at least two duly qualified veterinary surgeons, who have previously examined the horses and found them free from any disease of an hereditary character. At such a gathering it would also be possible for representatives from the various societies to select the animal they desired to serve in their district for the ensuing year. Thus a double object would be obtained, which, in the course of a few years, would materially aid the improvement of horse-breeding throughout the State and develop an industry which at present is only in its infancy. This particular State has great possibilities in the direction indicated, and if the industry is carefully husbanded in its early initiation, the results cannot be otherwise but of a satisfactory character. The enormous development which is now occurring in connection with our agricultural land will ensure steady demands for draught horses for many years to come, and there is always a good market for the lighter class either for police duty or export to India. If the State takes steps at this

early period to breed good and suitable sound horses no fears need be entertained with regard to this particular industry in the future, as animals which are known to be sound and carefully bred will command the attention not only of our own but outside countries.

SHEEP YARDS, SHEARING SHED, AND DIP.

P. J. GIBBONS, Stock Inspector.

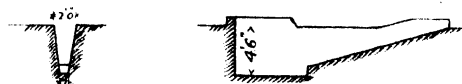
So soon as circumstances permit a suitable shearing shed, drafting-yards, and sheep-dip should be erected on the station or farm, as the case may be. Temporary premises are undesirable on account of the annual expense incurred in keeping them in order, besides the inconvenience and loss of time which these makeshifts cause. So that, however small a plan be required, it will be found cheaper in the end to construct a substantial workable plant.

The accompanying sketches show two separate plans of sheep-yards and dip, built in conjunction with a shearing-shed. The station plan will be found very suitable for working large numbers of sheep, and the farmers' for working small flocks. The plans being drawn to scale, are simple to follow, and speak for themselves, and may be modified to suit local conditions.

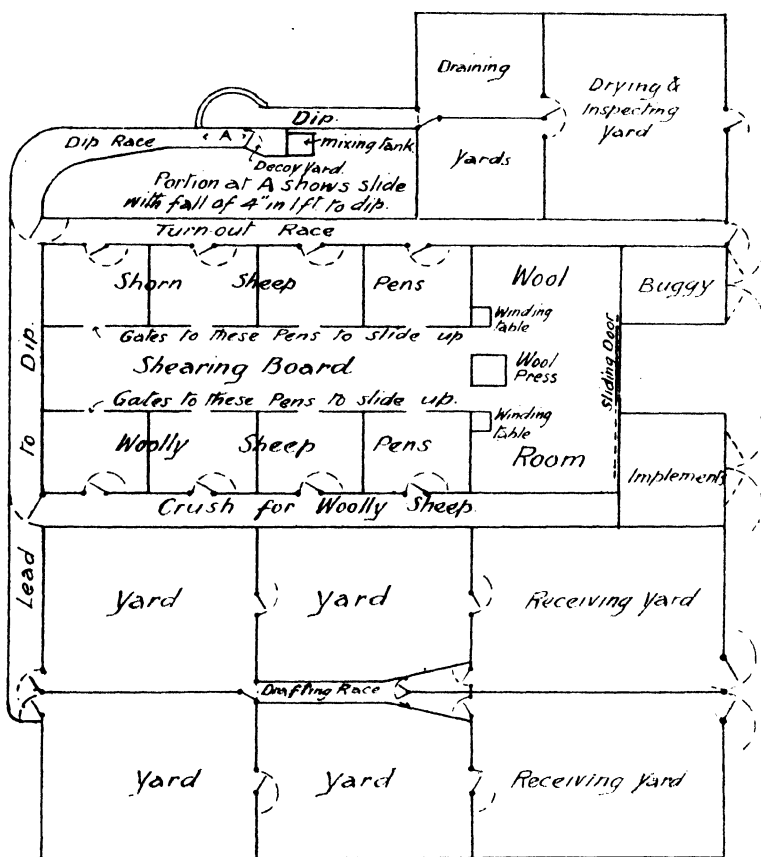
The shed and appliances may be built of any material suitable for the purpose. When the shearing is over the shearing board and wool space will serve as a shelter for vehicles, machinery, tools, etc., where they may be safely kept from the weather. Good sound bush posts sawn off square at the top and placed close together, 16 or 18 inches in the ground, according to the nature of the country, with a plain fencing wire running through them about a foot from the top, make very substantial and serviceable sheep yards.

The drafting race, however, should be made of sawn timber placed lengthways. On large runs where big mobs of sheep are yarded and much drafting is done, it is preferable to have the drafting and dip-yards made oval or round. Square yards are awkward to work because the sheep get wedged and crushed in the corners and are unable to run freely, whereas with round or oval yards there is nothing to prevent them being moved in any direction. The dip should be built of either brick or stone and rendered in cement; wood or iron, though not so durable, may be used. The draining-pens should have a concrete floor slanting towards the centre to carry the drip down to a middle drain, and thence into the dip. The "receiving" and "turn out" yards are provided with a race leading to the dip, which differs from those usually seen in that the dip is not placed at the end of the forcing race, but at the side, so that the sheep cannot see the bath when running towards the decoy pen, where three or four of their number are penned up. Opposite the well at the side of the dip between the race limit and the decoy pen, there is a concrete or iron slide, set at such an angle that the sheep in attempting to reach the decoy pen

Farmers' Sheep Yard Shearing Shed and Dip



Cross Section Longitudinal Section
through Dip.



Scale 0 10 20 30 40 50 Feet

are unable to obtain a footing, and slide gently into the dip. This method does away with all handling of sheep, and is, therefore, a great saving of time and labour. The advantages claimed for these two plans are, being compact they are easily worked, the sheep are always under control, and their efficiency in carrying out the shearing, drafting and dipping all in one muster.

THE RABBIT-PROOF FENCE.

CHIEF INSPECTOR'S REPORT.

Mr. Alex. Crawford, Chief Inspector of the Rabbit Department, has made the following report on his recent extended trip:—

"I proceeded north from Burracoppin on the No. 1 fence. It has been an unusually wet season north, and travelling was often very heavy. First day out we sunk down to axles in one place and had to unload to get the trap out. Where the country was not boggy it was sandy and very heavy pulling, and we could only average a little over 20 miles a day right through. North of Burracoppin, about six miles, there is a farm, on which fair crops are obtained year after year, and just before starting out I saw a new settler, who has lately taken up land close to Burracoppin, and who was just unloading farming implements. As an instance of how little we know of the capabilities of this State, I may say that 45 miles north of Burracoppin Mr. Maddock has successfully run a mixed farm for many years, and when I passed through was busy getting his crop in. For 30 or 40 miles north from Burracoppin there was plenty of good agricultural land, consisting of salmon gum, gimlet wood, morrell and a few York gums. If two settlers can make ends meet up here there is no reason why many others should not. We went as far north as Barrambie, and with the exception of some hard spinifex country almost all the country is fair pastoral land. The bulk of it is well suited for horses and cattle on account of the top feed, while in some places the amount of salt bush would justify the running of sheep.

"For the first 200 miles we travelled the fence has required but few repairs, as it is not exposed to danger by fire or flood. There are very few head of large stock wandering about, and there is no traffic. The worst enemies here are kangaroos and emus, and not great numbers of either. From the 200-mile post north of Barrambie the fence has time after time suffered severely from washaways, sometimes miles of the trenching being washed out, and some heavy washaways had taken place just prior to our visit, but these had been well repaired, and the fence was as good as ever. I examined the fence carefully all the way, and in only one place did I find that it was below the minimum height, and that only an inch. The fence as it stands to-day is as rabbit-proof as the day it was erected, and reflects great credit on the boundary riders who have charge of it. The salmon gum straining posts are being gradually white-ant eaten, but these are being replaced

from time to time, and a large number of them have been condemned by the sub-inspector that will gradually be replaced, but none of them are in an actually dangerous condition at present. There were a few minor faults noticed, the most serious of them being that some of the gates had been allowed to sag, making the opening and closing of them rather difficult. Unless the gates are kept in good order there is a danger of them being not properly closed by the travelling public. This matter will be remedied at once.

"Rabbits.—For about 140 miles north of Burracoppin rabbits are fairly thick outside the fence, and considerable numbers are being caught in the yard traps. The boundary riders, however, inform me that they are scarce now compared with what they were some time since, or will be in another month or two, when the breeding season is finished. Farther north there were very few fresh traces of rabbits, but the remains of thousands of dead ones were found all along, hundreds of thousands having died last summer, many of them from starvation and want of water, and possibly from some disease. On the east side of the fence there is scarcely any feed to be seen that the rabbits can get at, while on the west side of the fence there was grass and saltbush in abundance. In many places the east side of the fence was a desert, and the west side like a green field. In some places there were evidently a considerable number of rabbits on the west side of the fence, and I think a considerable number of yard traps should be erected on this side. There are some now, but not enough. Every rabbit destroyed on the west side is worth hundreds on the east. Dingoes and cats are responsible for the destruction of enormous numbers of rabbits, and outside the fence dingoes are very numerous. We saw quite a number, and in some cases they followed our trap for miles. On the east side of the fence there were the tracks of dingoes all the way we went in great numbers, but on the west side it was the exception to see a track at all. The fence seems to prove a barrier to them, and the only place the dingoes seem to get over is at the gates. Cats are very numerous. We saw a great many tracks, but on our trip we only found one in the traps, but on his last trip Sub-Inspector Craig liberated 45 along this portion of the fence. It is the domestic cat gone wild that is most numerous, but native cats are occasionally found. In the summer time the large iguanas are responsible for the destruction of large numbers of rabbits.

"On the way up I camped for two and a half days at the departmental reserve at the 163-Mile, to run the lines for a paddock to keep our spare and young camels in. I am enclosing about 3,000 acres of fine saltbush and mulga country and there is a bore with good water. I am having a deviation put in at Barrambie, where the present fence runs right alongside the mine, and the gates are being often left open and the netting pushed down. Rabbits are very numerous in the range on the east side, and this is the greatest source of danger on the fence. The deviation is about nine miles in length, and will be to the west of the existing fence. I intend starting to inspect the No. 3 fence next week, so that I may deal with it in my annual report.

"The water supply along this fence to Gum Creek is fairly good, and causes no inconvenience, except in one place across a spinifex plain. A rain shed and tanks would be a great convenience, the tank or soak only holding water in the winter. After the rain the nights were intensely cold, with very heavy frosts; so heavy, in fact, that water left in a dish for 15 or 20 minutes in the morning would have ice on it."



Geo. Hill.

Brunswick State Dairy Farm.

1. View of stables, silos, and milk room.
2. Burning off Red Gum land.
3. Pearl millet under irrigation.

RABBIT DESTRUCTION.

Mr. Crawford also draws attention to the requirements of the Rabbit Act in the following extracts:—

"It shall at all times be the duty of the owner and of the occupier of any land to suppress and destroy, to the satisfaction of the chief inspector, all rabbits which may from time to time be upon such land or upon any roads bounding or intersecting the same, or any part thereof. Every occupier upon whose land there are rabbits, or signs or marks of rabbits, shall immediately give notice to the inspector whose residence shall be nearest to the land. Any owner or occupier who fails to fully and continuously perform such duty, and any occupier who fails to give such notice, shall be liable to a penalty on the first conviction of not more than ten pounds, and on the second, or any subsequent conviction, of not more than fifty pounds." I would point that if steps are taken promptly and continuously on the first appearance of rabbits to deal with them, there need be but little to fear, and the expense will not be heavy, but if they are once allowed to get a hold it may be a very serious matter for the settler. It should be remembered that the Act is framed for the protection of the farmers and settlers themselves, and in their own interests they should do all they possibly can to carry out its provisions, and see that their neighbours do likewise.

The following are the general methods adopted in rabbit destruction according to the pamphlet, which gives full particulars connected with the preparation and laying of poisons:—

"Phosphorised pollard is by far the most effective and one of the cheapest, and, if mixed according to the directions given in this paper, there is no danger whatever of the baits catching fire after being laid out.

"I would here give a word of warning. Phosphorus is highly inflammable, and, if care is not taken in handling, serious burns would be the result. It should never be touched with the hands, and should be always cut up under water.

"If by any accident phosphorus should get on the hands, plunge the hands into water at once if possible, and with a small bit of rag wipe the phosphorus off the hands under water.

"Strychnine and arsenic are good poisons, and very adaptable for poisoning twigs or poisoning water.

"Toxa is a very good poison, and is very useful for small farmers, who would possibly only require small quantities of poison.

"S.A.P. is also a useful poison, ready for immediate use.

"Cyanide of potassium, for poisoning water, is a cheap and efficient remedy for destroying rabbits in dry areas, especially where waters at which the rabbits have been used to drinking can be fenced off with wire netting.

"Other methods of destroying rabbits are by traps, and with these an experienced trapper can do good work.

"Dogs will be found of great service. Fox terriers and Irish terriers are very good dogs for scenting up rabbits, and the ordinary kangaroo dog for catching after the rabbit has been put up.

"For distributing phosphorised pollard no machine has been found equal to the 'I.X.L.' poison cart.

"Where any colonies of rabbits have become established, the men should, say, two or three days after poison has been laid, dig out all the burrows."

FARMERS' ASSOCIATION MEETING AT BRUNSWICK.

— — —
ADDRESS BY MR. KINSELLA.

Ensilage and Silos.

Speaking recently before the members of the Farmers' Association, Mr. J. A. Kinsella, of the Agricultural Department, dealt at some length with the importance of our farmers entering on a more extensive scale into the growing of fodder-crops, and of converting same by means of the silo into good ensilage.

The speaker drew attention to the fact that in many parts of the State mistakes had been made which had resulted in failures in the making of ensilage, both in the stack and with new small silos. This was largely due to want of knowledge on the part of the farmer. The three main causes for such failures were (1), that the fodder was allowed to get too ripe before cutting; (2), that the stacks were improperly built, and (3), that the stacks were not weighted sufficiently. He dealt at length on the importance of cutting the maize at the proper stage, viz., when the leaves lowest down on stocks begin to discolour, and when the grains were fully developed, or just beyond the milky stage.

Lucerne.

The time to cut is when in the first bloom. These two crops are then at their highest feeding value for ensilage making. Other crops, such as barley, oats, wheat, sunflowers, beans, etc., should be cut a little on the green side. If allowed to get too ripe such crops would not contain sufficient moisture to permit of their curing into proper ensilage.

The silo should be constructed as high as possible, so as to secure good pressure from the depth of fodder itself.

The importance of absolutely excluding the air from the fodder was the secret in making first-class ensilage.

The speaker dwelt on the chaffing and weighting up of ensilage, and described several methods of weighting, including that of utilising the frame of the roof, which was often so constructed that the whole weight of the roof could be applied to the fodder.

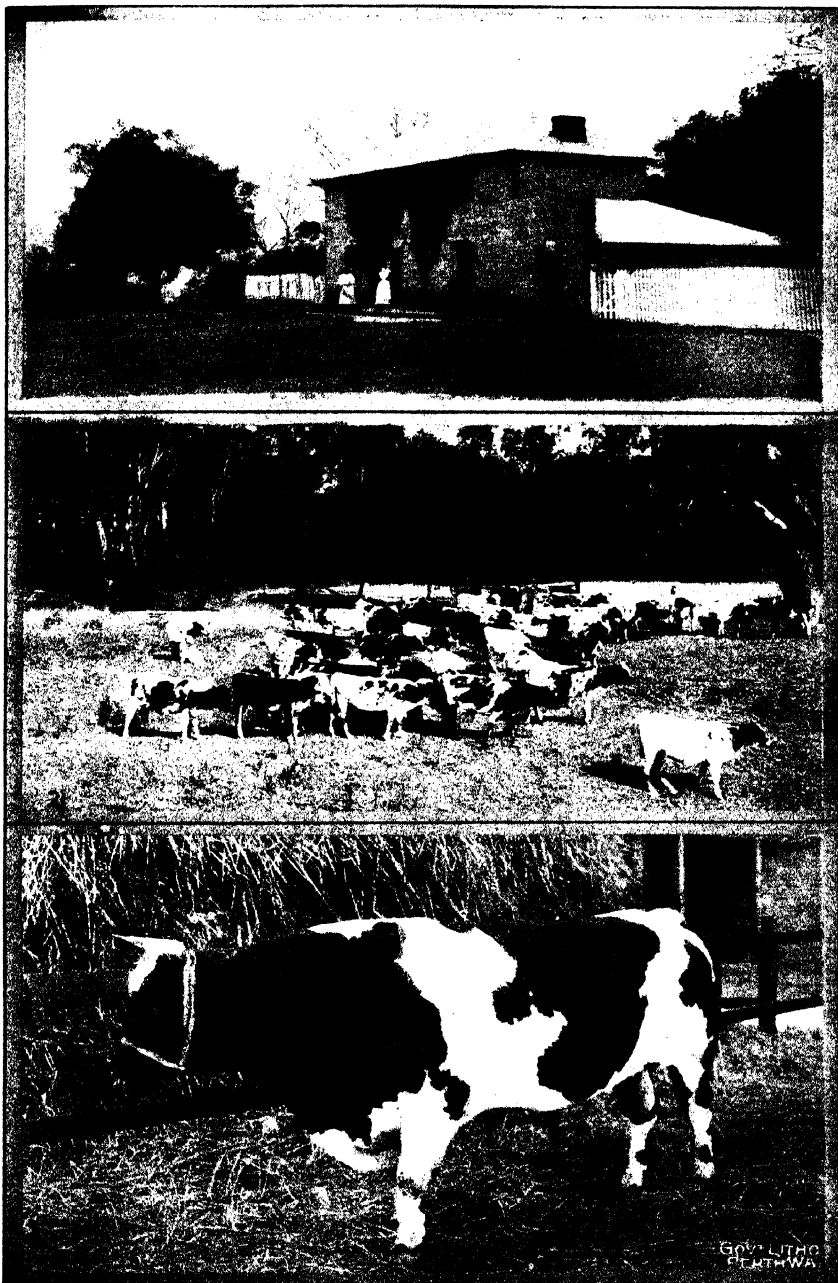
Co-operation.

Mr. Kinsella urged the farmers of Brunswick to support the new co-operative butter factory at Bunbury, of which some of them were shareholders.

He described the New Zealand system of co-operative dairying as the finest in the world, outside Denmark.

He contrasted this sound system, where the farmers absolutely controlled their own businesses, with the much cut up dairying business run practically by private concerns in North America.

The hundreds of small private-owned factories were a curse to the Canadian dairy farmer, and he hoped the farmers would take the advice given them as outlined in his pamphlet on co-operative dairying.



Geo. Hill.

Brunswick State Dairy Farm.

1. Homestead.
2. Group of yearling heifers.
3. Imported Ayrshire Bull. "Dot's Lad."

The Babcock Test Applied to our Herds.

Mr. Kinsella also pointed to the importance of keeping only cows that would produce a profit.

The duffer or robber cow should not be kept in any herd. He quoted from New Zealand statistics, compiled by himself, to show how one cow in a herd may be milked 14 times a week for 3s. 2d. per week, or £5 7s. 6d. for the whole season, while another cow in the herd produced £13 4s. 2d. for the season.

The speaker described what was being done in Canada, and also gave his hearers particulars of the first cow-testing association established in Denmark, where the system first originated.

Record Testing Associations in Denmark.

Such work would be costly, and in some cases impracticable, for the individual farmer to carry on single-handed, but on the co-operative plan the cost to the individual farmer would be comparatively slight, and within easy reach of all.

The only accurate and reliable means of obtaining the information sought would be by the use at regular intervals of weigh scales and fat tests, and by a carefully-kept record of all details connected with the work.

In 1895 there were two associations with 47 members and 834 cows. In 1904 there were 402 associations, with 8,991 members and 155,287 cows. In 1907 there were 421 associations, and over 200,000 cows.

By-Laws, etc.

The association shall elect a board of management of three members, one of whom shall retire each third year. The retirement shall be by drawing lots for the first two years. The board of directors shall elect from among their number a president, who shall also act as manager and treasurer.

The board of management shall, on behalf of the association, engage an expert assistant to attend to the sampling and testing of the milk from the individual cows owned by members of the association. The assistant shall also keep a complete account of the milk and butter yield from, and the quantity of food consumed by, each cow. He shall also prepare statements showing the comparative results from the different herds and the individual animals in each, in order that a selection may be made of the animals which would appear to be specially valuable for breeding purposes.

Method of Working.

When a record association has been formed, an assistant is engaged to carry out the practical details of the work. Being supplied with a complete sampling and testing outfit, he makes periodical visits to the farms of each member, the frequency of his visits depending on the number of members.

In the majority of cases each farm is visited once every two weeks, and the day's milk from each cow is carefully weighed, and afterwards sampled and tested by the assistant, who makes the entries in a book kept specially for the purpose, not only of the milk and butter-fat yield, but also of the quantity of the feed consumed by each cow since his last visit.

The farmer keeps a record of the latter from day to day and as accurately as possible. A uniform system of book-keeping has been

adopted by nearly all these associations. The results of the days milkings, multiplied by the number of days that have elapsed since the previous test, are taken as the yield for that period.

Cleanliness is, of course, observed throughout; the stables are bright and well-ventilated, and the cows well-groomed. Each milker is supplied with a damp towel for brushing the udders of the cows to be milked, and several wash-basins are placed at convenient points in the stable and used by milkers.

One of Dr. Hegelaud's former pupils writes to say that he has conducted fifty courses in the new method of milking on farms throughout the province, and the total attendance at these classes was 885 men and women.

Creamery Statistics.

The statistical work is gaining ground and importance every year, and receives a Government grant annually of £450 for the maintenance of the bureau, which not only collects and publishes statistical information relating to the operation of the creameries but also the butter prices realised by each every week, the latter being published in the public press weekly.

One notable fact with the reports published by the bureau is that nearly all the creameries that have furnished their returns for a few years have shown a yearly reduction in their expense for fuel, an item amounting to nearly one-sixth of a penny per pound of butter manufactured. A mechanical and engineering expert is employed to advise creameries in the matter of installation and economical operation of steam-boilers and engines, and it is largely due to his efforts that a number of the creameries have been able to effect a reduction in the expenses for fuel, or rather more economical use of fuel.

The forms to be filled out by creameries who submit their records to the bureau for creamery statistics show among other items the amount paid out for milk transportation, cartage of coal, butter, etc., salaries of managers, amounts paid for fuel, ice, butter packages, lubricants, salt and colours, rennet, etc., maintenance and renewal of milk wagons, cleaning material, office and postage, interest on capital, and other expenses.

WESTERN AUSTRALIAN APPLES IN LONDON.

The Department has received a return from the fruit brokers in London who were entrusted with the sale of a number of cases of West Australian apples. The statement shows that the sales were successful, particularly with regard to the fruit against which the charges for railage in this State were not heavy, and the producers concerned all had standing to their credit several amounts which have been handed over to them.

The consignments were sent away in March last from orchards at Mt. Barker and Pinjarrah. Mr. W. Sounness, of Mt. Barker, despatched 110 cases, which realised £60 12s. From this amount had to be deducted local

charges amounting to £23 3s. 11d., and London charges, £6 17s. 11d., making a total of £30 1s. 10d. A balance remained of £30 10s. 2d., which showed a net profit of 5s. 6½d. per case at the orchard. In this case the costs were particularly heavy, on account of the unusually long railage to Fremantle, where the fruit was shipped.

The other accounts stand as follow:—

E. Fawcett, Pinjarrah, 18 cases realised £11 10s., less charges £4 14s. 8d., leaving a balance of £6 15s. 4d., or a net profit per case at the orchard of 7s. 6¼d.

W. H. Smith, Boyanup, 30 cases realised £19 2s., less charges £7 19s. 9d., leaving a balance of £11 2s. 3d., net profit per case of 7s. 5d.

R. Paterson, Pinjarrah, 6 cases realised £3 19s., less charges £1 13s. 1d., leaving a balance of £2 5s. 1d., profit per case at the orchard of 7s. 6¼d.

It will be seen by this return that the fruit grown in the vicinity of Albany will have to be shipped from that port in order to yield a better profit to the grower.

POULTRY NOTES.

By FRANK H. ROBERTSON.

Mr. S. Craig's Poultry Farm.

It was in May, 1905, that I first visited Mr. Craig's place. Since then he has greatly enlarged his poultry operations, having bought more land, erected a large number of houses and runs, and greatly increased his stock and, of course, egg yield. Last season 13,000 dozen eggs were sold, mostly for the market, but he does a good business in eggs for setting, chiefly for incubators; one customer took 1,600 eggs, and another 1,700. In addition to eggs the sales for stock birds run into some hundreds of pounds per annum. The stock, which at time of visit numbers about 2,000 head, consists chiefly of White Leghorns of the best laying strains, and that they are good in this respect is proved by the fact that Mr. Craig's pen scored third at the first Subiaco Competition, and his pen in the present contest is now No. 6 on the list. For keeping up the egg-laying qualities of his stock this breeder is showing great enterprise, as he has just erected 100 small runs, each 3ft. x 30ft., in which to make a certain test of 100 of his best pullets; one bird being kept in each run and an accurate record of each bird's egg yield is thus obtained to an absolute certainty, and is, I think, preferable to the trap-nest system, as it entails less supervision, and there can be no doubt as to its correctness.

The natural conditions of this place are just perfect for a poultry farm, sandy soil and plenty of small natural tree shelter; all overcrowding is avoided as all the runs are extra large, and about 50 head in each pen; there is an unlimited supply of green stuff, as market gardening is also carried on, and as an additional supply of green stuff there is a considerable area under lucerne, which grows with the greatest luxuriance on the moist flats, which yield six cuttings a year without irrigation.

During the warm weather the fowl droppings are raked up and bagged, and as a manure Mr. Craig considers it is worth over 3s. a bag.

The total area of the property is about 21 acres, and in addition to poultry raising the growing of vegetables for the markets is profitably carried on, but of late years the poultry department has been considered the more important branch of the two, so that at the present time the poultry farm is one of the largest and best in the State, and is a striking illustration of the combination of poultry and vegetables for profit.

Experiments in feeding for Egg production.

An exhaustive bulletin is to hand recently, issued by the Massachusetts, U.S.A., Agricultural Experiment Station, entitled "Poultry keeping for Egg Production," and gives the result of experiments extending over a period of thirteen years.

The conclusions arrived at are as follows:—

1. The regular use of Condition Powder, as advised by manufacturers, means money practically thrown away. Such use will not be likely to increase the egg product, and is unnecessary as a means of insuring health.

2. Cabbages given in moderation are superior to cut clover rowen as winter food. Their use means more eggs, but if the amount given is large, the flavour of the eggs is injuriously affected.

3. The number of eggs produced is not affected by the presence of the male, but the average weight of the egg is increased.

4. Animal substances are much more valuable as sources of protein in feeding fowls than vegetable substances, even though the latter contain equal percentages of that nutriment. Concentrated vegetable foods such as Soy bean meal, linseed meal, gluten meals, etc., should not be used to replace all or even a very large part of animal foods, such as meat or animal meals, beef scraps, cut bone, and meat, etc.

5. The dry prepared animal foods, such as beef scraps and animal or meat meals if of good quality, are cheaper and safer feeds than cut fresh meat and bone, and can be so used as to produce an equal egg yield.

6. Feeding the mash in the morning, with care not to give too large a quantity, is preferable to feeding it at night. The differences in egg yield on the two systems are small, but giving the mash at night, especially in winter, must mean empty crops and gizzards long before morning.

7. Corn may safely be largely used in rations for laying hens, but its use requires unusual care not to over-feed for best results, and it must be supplemented by a liberal proportion of animal food. With such care and so supplemented, the use chiefly of corn, whole or cracked, and corn meal rather than much wheat and wheat or corn by-products is attended with the following advantages: lower food cost, both per day and per egg, rather more eggs, higher average weight of fowls and better market quality when dressed, and an earlier and better moult.

8. Buckwheat in any large proportion is less desirable food for laying fowls than corn.

9. It is not best to use largely grains or meals carrying hard tough fibre in large proportion. Under otherwise similar conditions the less such fibre in the ration the better will be the egg product. Oats, barley, buckwheat, and by-products containing the husks of these grains should be sparingly used.

Dealing with the above conclusions as applied to local and general conditions:—1. The use of condition spices is not employed by the general body of poultry keepers in this State. 2. We have always considered cabbages a valuable green food. The writer when conducting the Narrogin Competition always used them when obtainable, with excellent results; the custom there was to put the leaves through the chaff cutter and serve green, the stalk portions were boiled and mixed in the mash. 3. The results of the Subiaco Competitions have testified that the presence of the male bird has made no decrease in the egg yield, and with regard to size of egg, the Narrogin eggs were certainly smaller than the Subiaco ones. Male birds were not in the pens at Narrogin, but it must also be remembered that the climatic conditions were also different. 4. The use of animal food is generally admitted here, but its value as compared with strong nitrogenous vegetable foods such as peas and beans has probably not been tested, therefore it is satisfactory to learn that the American experiments agree with our generally recognised system of feeding for egg production. 5. Our experience also agrees with the American as seen by the late Subiaco Competition; we had splendid results when using the Q.M.E. Meat Meal, but latterly when depending on fresh cut bone for our animal food the egg yield has much decreased. 6. Feeding the mash in the morning is our universal custom, but the experimentalists admit that the difference is small. At the Narrogin Farm the poultry (not the Competition birds) were fed for several months, mash at evening and grain in the morning, and a good egg yield obtained, therefore I consider that if it is not convenient to make up mash feeds early in the morning, it can be given at evening without material difference. 7 and 8. The use of corn (or maize as we call it) and buckwheat do not come largely among our poultry feeds, owing to their high price, but as an occasional change food it comes in very well. 9. Finally as regards oats, they are used when obtainable at a fair price, but the long husky varieties are avoided.

A WEST AUSTRALIAN INCUBATOR FACTORY.

This State is a large importer of incubators, chiefly American, and probably if it were better known that good serviceable machines are obtainable of local manufacture, the imported article would not be so generally used. The machine I refer to is the "Simplex," made by Mr. F. J. Roberts, of Mackie Street, Victoria Park, who has had many years' experience of the business in both this and the Eastern States, also New Zealand. The machines are made on the well-known Hearson principle, but consume less oil; some of the machines are specially made for duck hatching, and this class of poultry-raising forms an important feature of the business, as large numbers of ducklings are sold every season. In addition to the Incubator Factory, poultry raising is carried on in a very satisfactory manner, under the name of the Taieri Poultry Yards; the runs are laid out in a very neat and serviceable manner, and provided with excellent shade; the houses are built on the double principle, and outside the pens, which is the most convenient system; some are occupied with White Leghorns of the best laying strains; there are also Indian Runners, but the special feature is the White Indian Runners, which Mr. Roberts has been for some years producing; he has now bred several very typical specimens, and has got a pen of them in the present Egg Laying Competition.

SECOND EGG-LAYING COMPETITION AT SUBIACO.

[Commenced July 1, 1907, closed June 30, 1908.]

The following are the full results:—

The figures in black indicate the highest for the month.

The first column of figures shows the position of the pens at the close of the competition.

FOWLS.

Six pullets and one male bird in each pen.

WON BY A. H. PADMAN'S WHITE LEGHORNS, WITH 1,411 EGGS.

Owner and Breed.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	Total.	Market value, £ s. d.	Weight, Ozs.
1 A. H. Padman (S.A.), W.L.	106	145	147	165	122	153	135	126	118	91	59	44	1,411	4 15 8	2 1
2 J. Stuart, Golden Wyandotte	123	143	146	152	132	141	104	106	121	104	72	53	1,400	8 3 8	23½
3 Craig Bros., White Leghorn	96	137	140	151	136	130	126	120	96	78	52	30	1,295	7 6 6½	23½
4 J. and T. Robertson, W.L.	111	137	150	152	147	132	112	110	89	76	31	16	1,263	6 19 1	24½
5 O.K. Poultry Yards, W.L.	116	141	140	144	135	138	119	116	120	70	20	1	1,260	6 18 8	23½
6 S. Craig, White Leghorn	108	130	141	151	128	124	133	106	96	69	30	18	1,234	6 16 7½	23½
7 Mrs. McGree, W. Wyandotte	66	135	140	148	132	133	117	105	84	87	40	1	1,188	6 11 5	23½
8 C. E. Herbert, White Leghorn	101	138	147	138	126	120	113	107	63	52	33	8	1,146	6 4 4	25
9 Glendonald P.F., G.W.	74	159	141	119	123	114	116	97	98	74	23	3	1,141	6 4 9½	22½
10 Mrs. M. Hughes, W.L.	62	137	143	145	134	122	115	97	89	64	30	2	1,140	5 18 1½	23½
11 J. D. Wilson, Brown Leghorn	123	141	148	124	123	135	90	90	63	43	35	4	1,119	6 0 7	23½
12 Mrs. H. M. Kelley, G.W.	78	150	153	158	148	130	115	84	51	17	6	18	1,108	5 12 4½	24½
13 Sunnyhurst (S.A.), W.L.	88	100	131	149	125	132	118	100	75	60	14	14	1,106	6 0 1	24½
14 Austin and Thomas, W.L.	91	100	138	140	134	128	104	98	85	49	32	6	1,094	5 13 6	23½
15 G. George, White Leghorn	87	115	142	149	145	136	113	105	77	27	2	2	1,075	5 15 8	24
16 Scotch-American P.F., W.L.	81	140	131	129	137	109	102	93	56	67	20	4	1,065	5 10 0½	24½
17 O. James, White Leghorn	60	135	145	149	138	124	111	94	59	41	7	2	1,065	5 10 0½	24½
18 Mrs. H. J. France, W.L.	115	127	140	138	122	129	125	71	50	22	9	8	1,066	5 8 11½	22½
19 F. Mason, White Leghorn	56	98	129	132	123	117	89	80	79	69	54	23	1,049	5 17 2½	23
20 Adelaide P.V., R.C. B.L.	87	126	136	141	128	117	96	67	41	39	36	26	1,040	5 11 3½	25
21 Coolgardie Poultry Farm, W.L.	119	132	127	131	91	93	77	72	57	47	50	37	1,033	5 15 10½	22
22 L. Dobson, Silver Wyandotte	77	129	136	135	126	112	78	100	68	58	13	0	1,032	5 10 3½	23
23 J. R. Parkes, Brown Leghorn	94	104	132	138	120	126	108	94	77	37	4	0	1,031	5 8 10	23
24 North Lake Egg Farm, W.L.	103	125	143	141	108	96	101	89	78	34	11	0	1,029	5 8 10	23
25 C. W. Johnson, White Leghorn	65	111	131	139	135	117	85	81	57	52	9	8	980	5 4 1½	26½
26 Adelaide Yard, W.L.	107	97	133	134	127	104	94	76	76	45	17	16	986	5 5 10½	28½
27 A. & G. Buttsworth, Blk. Orps.	67	116	128	134	109	100	80	66	47	54	28	1	970	5 4 4½	27½
28 Bassett and Titterton, W.L.	75	136	136	120	110	107	79	74	69	36	1	18	961	5 0 8½	26½
29 G. A. Innes, White Leghorn	44	82	141	140	146	117	103	103	64	15	0	0	958	4 17 6	26½
30 Perth Poultry Farm, W.L.	97	115	134	142	128	124	61	76	46	0	0	19	942	4 15 1	26½
31 B. Jones, White Leghorn	16	100	135	152	122	118	94	73	71	39	13	7	940	4 18 2½	24½
32 E. E. Ranford, Minorca	67	122	136	141	117	95	89	83	62	16	2	7	937	4 15 8½	28

34 J. Stuart, S. P. Wyandotte	27	125	122	98	90	95	72	79	59	63	57	38	925	5	5	91	234
35 Savage and Jones, W. L.	104	109	131	140	113	112	87	66	36	5	1	2	905	4	10	72	26
36 Digby Poultry Yard, Br. L.	53	121	136	134	128	123	82	52	45	29	0	0	903	4	10	01	221
37 A. F. Farrant, W. Wyandotte	70	111	123	106	65	101	72	64	80	62	22	22	898	5	0	51	244
38 White Wings P. Y., W. Leg.	106	76	141	141	132	101	71	59	58	0	10	0	895	4	10	91	264
39 Scotch-American P. F., Br. L.	66	102	106	128	122	104	108	86	55	10	0	0	887	4	10	44	234
40 Chas. Thomas, White Leghorn	90	106	131	139	109	108	90	62	43	0	0	9	887	4	8	81	224
41 A. F. Farrant, P. Wyandotte	108	115	108	109	83	87	71	54	49	36	49	14	883	4	18	01	224
42 R. A. Dusing, Minorca	51	118	121	133	128	115	92	84	38	0	0	0	890	4	6	11	30
43 Mrs. Tuill, White Leghorn	85	114	113	114	115	109	98	61	29	16	12	9	875	4	9	81	254
44 O. K. Poultry Yard, R. C. Br. Leg.	66	112	113	104	84	110	84	75	61	24	7	23	863	4	11	91	214
45 D. Young, Black Orpington	64	113	118	96	105	84	95	74	83	50	52	11	855	4	16	10	244
46 B. Tonkin, White Leghorn	68	101	126	127	121	105	63	80	33	14	4	6	853	4	6	7	264
47 L. Despeisis, Houdans	64	73	82	127	124	120	89	82	50	0	8	22	841	4	7	63	254
48 Sunnyside (S.A.), Blk. Orps.	61	111	119	114	95	93	70	45	60	18	36	15	837	4	9	11	254
49 Craig Bros., Black Orpington	73	80	110	111	93	84	65	70	78	51	28	37	830	4	13	51	20
50 E. Krachler, R. C. Br. Leg.	23	111	123	114	92	88	62	49	52	23	23	19	829	4	7	91	234
51 Jas. Kirk, Silver Wyandotte	50	118	102	71	80	72	76	73	67	52	41	22	824	4	10	01	224
52 Mrs. H. M. Kelley, White Leg.	40	100	125	136	129	120	81	54	16	2	0	7	810	3	17	10	25
53 A. F. Farrant, Buff Orpington	120	121	107	98	77	59	50	42	39	39	17	5	774	4	2	11	25
54 W. R. Read, Golden Wyandotte	49	89	103	91	73	68	62	51	34	37	57	39	753	4	5	11	244
55 Buff Poultry Farm, Buff Orp.	57	99	100	111	88	76	77	44	43	11	18	28	752	3	18	11	234
56 G. M. Buttsworth, White Leg.	51	125	97	101	93	84	61	58	27	16	9	10	732	3	14	51	224
57 J. Stuart, White Rocks	65	99	104	110	73	53	42	56	51	32	21	10	716	3	9	21	27
58 J. Stuart, Buff Orpington	76	132	125	94	74	85	44	35	44	6	0	0	715	3	9	91	224
59 A. F. Spencer, White Leghorn	27	62	102	133	128	107	82	61	7	0	0	3	712	3	8	4	244
60 Master Stanes, R. C. Br. Leg.	58	126	124	123	103	85	37	21	18	3	0	0	704	3	6	03	204
61 Thamar Poultry Farm, W. Leg.	50	104	91	95	83	72	64	49	43	37	10	4	702	3	14	01	264
62 Honner and Forbes, Minorca	12	91	129	103	84	88	73	60	22	0	0	0	662	3	3	8	28
63 Non-competitive, crossbreds	0	62	81	85	78	73	62	46	53	28	23	27	618	3	8	7	224
64 Mrs. E. Byass, Salmon Fav.	29	54	96	87	75	87	73	55	32	7	0	0	604	3	0	8	26
Totals	...	4,696	7,272	8,137	7,260	6,873	5,681	4,910	3,858	2,319	1,258	798	61,154				

Winner of first three months' test, J. Stuart, 1st, Golden Wyandotte, 415 eggs, £3; H. M. Kelley, 2nd, 412 eggs, £2; A. H. Padman, 3rd, 398 eggs, £1.

Winner of last three months' test, J. Stuart, 1st, Golden Wyandotte, 229 eggs, £3; A. H. Padman, 2nd, 194 eggs, £2; Craig Bros., 3rd, 160 eggs, £1.

Winner of first monthly prize, J. Stuart, Golden Wyandotte, 126 eggs; second month, Glendonald Poultry Yard (E. W. Stanes), Golden Wyandotte, 159 eggs; third month, Sunnyside, White Leghorn, 153 eggs; fourth month, A. H. Padman, White Leghorn, 165 eggs; fifth month, Sunnyside, White Leghorn, 148 eggs; sixth month, A. H. Padman, White Leghorn, 153 eggs; seventh month, A. H. Padman, White Leghorn, 135 eggs; eighth month, A. H. Padman, White Leghorn, 126 eggs; ninth month, J. Stuart, Golden Wyandotte, 121 eggs; tenth month, J. Stuart, Golden Wyandotte, 104 eggs; eleventh month, J. Stuart, Golden Wyandotte, 72 eggs; twelfth month, J. Stuart, Golden Wyandotte, 53 eggs.

EGG-LAYING COMPETITION—continued.

DUCKS.

Six ducks and one drake in each pen.

WON BY G. THOMSON'S INDIAN RUNNER DUCKS, WITH 1,571 EGGS.

Owner and Breed.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	Total.	Market value, £ s. d.	Weight, lbs. Oms.
1 G. Thomson, I.R.	177	163	171	164	169	138	109	81	7	108	139	1,571	1,571	7 13 21	35
2 R. A. Dusting, I.R.	160	182	167	177	169	168	143	75	51	58	80	109	1,493	7 2 8	28½
3 Scotch-American P.F., I.R.	120	175	158	168	161	163	160	112	90	44	47	59	1,457	6 16 1	34½
4 Smith and Davenport (Vic.), I.R.	0	129	166	182	168	176	148	87	96	56	53	74	1,333	6 4 11	31½
5 T. Anderson, I.R.	11	32	165	170	158	153	128	94	64	64	106	120	1,265	6 8 9	33
6 F. King, I.R.	109	174	165	164	161	152	93	83	53	25	30	37	1,246	5 10 5½	30½
7 L. Mellen, I.R.	44	137	165	160	164	163	96	71	69	47	23	105	1,244	5 15 3½	30½
8 Mrs. H. J. France, I.R.	145	156	161	161	159	148	91	59	57	21	15	33	1,206	5 5 10½	32½
9 D. F. Vincent, I.R.	49	109	138	175	150	165	139	98	45	8	21	77	1,194	5 6 10½	28½
10 Adelaide Poultry Yard, I.R.	47	160	173	171	163	156	98	46	66	8	9	42	1,100	4 11 10½	34
11 A. J. Walters, Buff Orp.	93	135	130	162	147	113	54	1	68	81	28	14	1,024	4 13 2½	31½
12 C. W. Johnson, I.R.	105	136	129	122	157	121	93	79	15	0	0	52	1,009	4 7 4	31
13 White Wings P.Y., Buff Orp.	60	158	157	155	147	121	65	31	25	0	19	45	983	4 5 6½	32
14 Austin and Thomas, I.R.	119	137	148	134	145	126	34	38	37	9	16	5	948	3 19 0½	32½
15 M. Kynaston, I.R.	75	99	144	142	136	90	19	40	54	20	58	63	940	4 2 8½	31½
16 J. and T. Robertson, I.R.	54	117	123	137	105	113	97	71	48	0	0	23	888	3 15 11½	32½
17 S. Perth P. Co., Pekin (No. 2)	35	157	170	149	142	122	65	0	0	0	0	0	840	3 1 6	33
18 North Lake Egg Farm, I.R.	0	58	157	157	155	120	32	47	17	6	0	23	832	3 7 3½	30½
19 S. A. McColl, Buff Orp.	11	127	155	154	141	119	26	0	18	0	0	0	751	2 14 6½	32½
20 Bon Accord, Buff Orp.	9	1	113	170	128	119	41	28	60	30	0	45	744	3 5 1½	33
21 E. Trenberth, Pekin	8	88	173	173	143	103	25	0	0	0	0	0	713	2 10 0	38
22 S. Perth P. Co., Pekin (No. 1)	0	68	165	152	140	134	35	0	0	0	0	0	694	2 9 2½	32½
Totals	1,368	2,712	3,405	3,506	3,303	3,014	1,848	1,169	1,013	484	599	1,055	23,475		

Winner of first monthly prize of 10s. G. Thomson, Indian Runner, 160 eggs; second month, R. A. Dusting, Indian Runner, 182 eggs; third month, Adelaide Poultry Yard, Indian Runner, and E. Trenberth, Pekin, equal, 173 eggs; fourth month, Smith and Davenport, Indian Runner, 182 eggs; fifth month, R. A. Dusting, Indian Runner, 169 eggs; sixth month, Smith and Davenport, Indian Runner, 176 eggs; seventh month, Scotch-American P.F., Indian Runner, 160 eggs; eighth month, Scotch-American P.F., Indian Runner, 112 eggs; ninth month, Smith and Davenport, Indian Runner, 96 eggs; tenth month, A. J. Walters, Buff Orpingtons, 81 eggs; eleventh month, T. Anderson, I.R., 106 eggs; twelfth month, G. Thomson, I.R., 129 eggs.

Winner of first three months' test, G. Thomson, Indian Runner, 500 eggs, £3; D. A. Dusting, 2nd, 463 eggs, £2; Mrs. France, 3rd, 402 eggs, £1.

Winner of last three months' test, T. Anderson, I.R., 290 eggs, £3; R. A. Dusting, 2nd, 247 eggs, £2; G. Thomson, 3rd, 239 eggs, £1.



No. 1 (Winning Pen).--Padman's White Leghorns.



No. 2 (Second).- J. Stuart's Golden Wyandottes.

REPORT OF THE SECOND SUBIACO EGG-LAYING COMPETITION.

There have now been held three Egg Laying Competitions in this State, all under Government supervision, viz., one (the first) at the State Farm, Narrogin, and two at Subiaco. A new one, known as No. 4, commenced at Subiaco on the first of July, for both fowls and ducks, and is to run for only nine months, so that future Competitions may run at the same dates as those of the Eastern States, and for the purpose of making a comparison as to the relative egg-laying qualities of 1st and 2nd year birds. Eleven pens of fowls and five pens of ducks of the last Competition remain in their pens and compete against the new birds, but separate records will be kept of each.

Although the competition just completed did not produce any record-breaking figures as regards the fowls, still the totals made by the two leading pens are remarkably good, viz., 1,411 eggs from Padman's White Leghorns, and Stuart's Golden Wyandottes, 1,400, only 11 eggs behind the winners; it was a very close thing between these two pens, and it is pleasing to see so good a general purpose variety as Golden Wyandottes holding such a prominent position, all the more so on account of their owner who is our largest and most successful exhibitor of high-class show poultry, thus emphasising the fact that show and utility strains can be combined in the one variety; other breeders of Golden Wyandottes have also shown up remarkably well, viz., No. 9 on the list, Glendonald Poultry Yards, and No. 12, Mrs. H. M. Kelly, these two breeders are also foremost exhibitors. The success of the winning pen of White Leghorns adds further confirmation of the remarkable egg-laying qualities of the South Australian breeder's strain of birds, as he has won three competitions and come second in a fourth in the various States viz., 1st Subiaco with 1,411 eggs; 1st Queensland, 1,538 eggs; Berowra, New South Wales, 1,457 eggs; 2nd South Australia, 1,528 eggs.

The ducks produced some remarkable records, notably the first pen of Indian Runners, 1,571, or an average of almost 262 eggs per bird for the 12 months, which is a record; other great records were 182 eggs out of a possible 186 by R. A. Dusing's and Smith and Davenport's Indian Runners for the months of August and October respectively.

However, taking the total egg yield, and it was not quite as heavy as last year, the birds at first gave promise of remarkable results, but they were not sustained throughout the competition, as the following monthly totals will show:—

	6 FOWLS.		DUCKS.	
	First Competition.	Second Competition.	4 Ducks in First Competition.	6 Ducks in Second Competition.
July	3,938	4,696	374	1,368
August	7,866	7,272	1,345	2,712
September	7,610	8,092	2,358	3,405
October	7,293	8,137	2,489	3,506
November	6,400	7,260	2,054	3,303
December	5,921	6,873	1,889	3,014
January	5,480	5,681	1,515	1,848
February	5,053	4,910	1,310	1,169
March	5,144	3,858	1,141	1,013
April	3,579	2,319	910	484
May	2,305	1,258	1,010	598
June	1,294	798	1,237	1,055
Totals	61,383	61,154	17,627	23,475
Average per pen 955.53; Average per hen 159.25.			Average per pen 1,067; Average per duck 177.84.	

The decreased egg yield during the latter months of the competitions is remarkable, and is particularly striking as regards the ducks, when it is remembered that there were six birds in each pen as against four in the first competition. To assign the cause it is impossible to definitely determine, but in view of the fact that dry meat meal was entirely used as animal food during the months when the egg yield was very good, and changed to cut green bone when the egg supply was small, makes one strongly suspect that the use of cut bone in place of dry meat was the chief cause of the diminished egg yield. Supplies of meat meal are still unobtainable, and as cut bone has to be used at the present competition, the results will be watched with much interest as an experiment on a large scale as to the merits of meat against cut bone. The animal food at the first Competition was for fowls: 1,586lbs., mostly dry meat; and at the second, 3,360lbs., about half dry meat and half cut bone. The ducks' allowances were: first Competition, 770lbs.; second, 1,792lbs.

The food consumed was as follows:—

Food Consumed for 12 Months.

HENS.					£	s.	d.
Pollard	...	...	...	890 bush.	53	7	4
Bran	...	...	...	107 "	7	7	7
Wheat	...	...	...	276 "	60	12	5
Meat	...	...	...	30 cwt.	21	18	8
Lucerne chaff	...	...	...	18 "	9	0	0
Oats	...	...	...	21 bush.	3	17	3
Maize	...	...	...	19 "	3	8	7
Oil cake	...	...	...	5½ cwt.	2	9	6
Green feed	...	...	...	...	2	17	10
Grit	...	...	...	15 cwt.	3	7	6
					£168	6	8

384 hens in pens, 64 male birds and 10 spare hens, total, 458.

DUCKS.					£	s.	d.
Pollard	...	...	...	373 bush.	21	14	5
Bran	...	...	...	99½ "	6	8	5
Meat	...	...	...	16 cwt.	11	12	0
Lucerne chaff	...	...	...	12 "	6	0	0
Oil-cake	...	...	...	6 "	2	12	6
Green feed	...	...	...	...	2	0	0
Grit	...	...	...	25 cwt.	5	12	6
					£255	19	10

132 ducks in pens, 22 drakes and 4 spare ducks, total 158.

Receipts (Hens).

					£	s.	d.
To pollard	...	...	...	53	7	4	
„ bran	...	...	...	7	7	7	
„ wheat	...	...	...	60	12	5	
„ meat	...	...	...	21	18	8	
„ lucerne chaff	...	...	...	9	0	0	
„ oats	...	...	...	3	17	3	
„ maize	...	...	...	3	8	7	
„ oil cake	...	...	...	2	9	6	
„ green feed	...	...	...	2	17	10	
„ grit	...	...	...	3	7	6	
„ balance	...	...	...	193	18	7	
					£ 362	5	3
					By market eggs	...	288 17 10
					„ com. on settings	...	47 13 5
					„ eggs sold to owners	...	25 14 0
					By balance	...	£193 18 7



No. 3 (Third).—Craig Bros.' White Leghorns.



No. 1 (First).—G. Thomson's Indian Runners.

Return of Eggs.

	Doz.	Market Range of Prices.
Eggs sold to markets	4,600	July 1s. 7d. to 1s. 3d.
„ sold to owners	246	August 1s. 3d. to 9d.
„ sold for setting	201½	September 1s.
„ breakages	48½	October 1s.
		November 1s.
		December 1s. to 1s. 3½d.
		January 1s. 2½d. to 1s. 5½d.
		February 1s. 8d. to 1s. 8½d.
		March 1s. 8d. to 1s. 10d.
		April 2s. to 2s. 2d.
		May 2s. 3d. to 2s. 6d.
		June 1s. 11d. to 2s. 2d.
	5,096·2	

Receipts (Ducks).

	£ s. d.		£ s. d.
Pollard	21 14 5	By Market eggs	91 2 11
Bran	6 8 5	„ Com. on settings	8 15 6
Meat	11 12 0	„ Eggs sold to owners	6 13 0
Lucerne chaff	6 0 0		
Oil cake	2 12 6		
Green feed	2 0 0		
Grit	5 12 6		
Balance	50 11 7		
	£ 106 11 5		
		By Balance	£50 11 7

Return of Eggs.

	doz.	Market range of prices.
Eggs sold to market	1,832	July 1s. 5d. to 1s. 1d.
„ „ for setting	45	August 1s. 1d. to 8d.
„ „ to owners	64	September 8d. to 10d.
Breakages	15·3	October 9d. to 10d.
		November 9½d. to 1s.
		December 10d. to 1s. 1d.
		January 1s. 1d. to 1s. 5½d.
		February 1s. 7d. to 1s. 6½d.
		March 1s. 7d. to 1s. 8d.
		April 1s. 10d. to 2s.
		May 2s. to 1s. 10d.
	1,956·3	June 2s. 2d. to 1s. 11d.

30th June, 1908.

The cost of fowls was 7s. 4d. per head, against 6s. 10d. at first competition; ducks, 7s. 1d. per head, against 7s. 10½d. It will be noticed that cost of fowls increased but ducks decreased; that was owing to increased price paid for wheat, but moderate cost of pollard owing to a favourable contract having been secured.

The housing, general management, and feeding of the birds by Mr. Allman was the same as in the former competition, and presents no striking features, and, briefly recapitulated, are as follows, viz.: pure sandy runs in a well sheltered locality, ample shade in summer time, extra large iron fowl-houses having an easterly aspect. Male birds in the runs all the time.

The Fowl-feeding.

The fowls were fed in the morning with a warm mash made of bran, pollard, and lucerne chaff, to which was added animal food, also occasionally a little oil-cake. The evening feed was chiefly wheat, occasionally varied with oats or maize. The mash was prepared by pouring boiling hot water on the lucerne chaff, then cover up with sacks and leave to steam all night in a wooden tub; next morning mix in the bran and pollard. The quantities of the component parts of the mash varied considerably, also their consistency; this mode being adopted so as to afford the birds a variety. For instance, the mash would be made very dry and crumbly for a few days, and then a very moist one would be introduced. Another change would be to make the mash with very little bran, and so on. The soft feed was placed in flat-bottomed round tins, a very liberal supply being given, especially when the hens were laying well. About half an hour afterwards any food remaining was taken away. The quantities eaten varied considerably, according to the weather and appetites of the birds. Green feed grown at the grounds, consisting of rape, kale, and Cape weed, was given at mid-day when available, but during the hot months of the year a considerable quantity (chiefly lettuce) had to be bought.

The Duck-feeding

was rather different to the fowls; it was nearly all soft feed, consisting of bran and pollard, served moister and made more bulky by the addition of a larger quantity of lucerne chaff and oil-cake; also more animal food than the fowls. Grain was only given when birds were off their feed. The heaviest feeding was given at evening, some remaining in the trees for the birds to eat during the night or early morning. The consumption of shell grit was very large, especially when the ducks were laying well.

Weight of Eggs.

The weight of eggs of each pen is given on the result list, and it will be noticed that they vary considerably, ranging from Black Orpingtons 20ozs. per dozen to Minorcas 30ozs. The winning pen's weight of $25\frac{3}{4}$ ozs. is very good; but strange to say, the second pen (Golden Wyandottes going $22\frac{3}{4}$ ozs.) beat the winners in market value. This is accounted for by better laying at the dearest period.

If weight of egg were taken into consideration we would find Dusting's pen of Minorcas much higher on the list, viz. from N 42 to N 16, calculating on the supposition of 24ozs. to the dozen as a good average weight. These Minorca eggs weigh 30ozs. to the dozen, and taking their record of 880, or 73 dozen eggs, multiply that by the difference in weight, viz. 6ozs. per dozen, gives us 438ozs., equal to 219 eggs of 2ozs. each, or a record of 1,099 eggs. The weight of the eggs taken all round shows a great improvement, and this is particularly noticeable in the eggs from the winning pen which went $25\frac{3}{4}$ ozs. to the dozen, against the same breeder's birds which were second last year with 23ozs. 10drs. For the present competition the weight of egg limit has been raised from 22ozs. to 23ozs. after the first three months.



No. 2 (Second). R. A. Dusing's Indian Runners.



No. 3 (Third). Scottish-American Indian Runners.

ENTRIES FOR THIRD SUBIACO COMPETITION AND PRICES OF EGGS PER DOZ. FOR SETTING.

HENS.

Pen No.	Owners.	Breeds.	Strains.	Price.
1	G. George ..	White Leghorn ..	American ..	10/6
2	Mrs. A. S. Craig ..	Black Orpington ..	Craig Bros. ..	10/6
3	Greenville Poultry Farm ..	White Leghorn ..	Padman—Ontario ..	21/-
4	Glendonald Poultry Yard ..	Silver Wyandotte ..	Own breeding ..	15/-
5	C. B. Bertelsmier (S.A.) ..	White Leghorn ..	Own breeding ..	12/6
6	Greenville Poultry Farm ..	Silver Wyandotte ..	Padman—Own breeding ..	15/-
7	T. W. Martin ..	White Leghorn ..	Sunnyhurst ..	10/6
8	F. Whitfield ..	Minorca ..	Dusting ..	10/6
9	White Wings Poultry Farm ..	White Leghorn ..	Own breeding ..	10/6
10	Craig Bros. ..	White Orpington ..	Simon Hunter ..	10/6
11	Gaffney & Bach ..	White Leghorn ..	Sunnyhurst ..	15/-
12	Craig Bros. ..	Black Orpington ..	Own breeding ..	21/-
13	Homebush Farm ..	White Leghorn ..	Own breeding ..	21/-
14	Mrs. McGree ..	White Wyandotte ..	Own breeding ..	10/6
15	J. Stuart ..	S.P. Wyandotte ..	Own breeding ..	12/6
16	Honner & Forbes ..	R.C.W. Leghorn ..	Grantham—Own breeding ..	10/6
17	R. G. Flynn ..	White Leghorn ..	Sunnyhurst—Padman ..	15/-
18	*J. Stuart ..	S.L. Wyandotte ..	Own breeding ..	12/6
19	Mrs. L. Mellen ..	White Leghorn ..	Own breeding ..	10/6
20	R. L. Martin ..	Black Orpington ..	Loughman—Creaser ..	21/-
21	E. Garbett ..	White Leghorn ..	Own breeding ..	10/6
22	South Perth Poultry Farm ..	R.C. White Leghorn ..	Small ..	10/6
23	Shanrock Poultry Farm ..	White Leghorn ..	Own breeding ..	12/6
24	*J. Miller (late Dobson) ..	Silver Wyandotte ..	Dobson ..	15/-
25	Mrs. A. E. Kinnear (S.A.) ..	White Leghorn ..	Own breeding ..	21/-
26	Allelaide Poultry Farm ..	Buff Leghorn ..	Own breeding ..	10/6
27	T. Hickey ..	White Leghorn ..	McGree ..	10/6
28	Lionhurst Poultry Farm ..	Buff Leghorn ..	Own breeding ..	10/6
29	C. Herbert ..	White Leghorn ..	Padman ..	15/-
30	Mrs. Hughes ..	White Leghorn ..	Padman—Sunnyhurst ..	10/6
31	A. H. Padman (S.A.) ..	White Leghorn ..	Own breeding ..	21/-
32	*Mrs. McGree ..	White Wyandotte ..	Own breeding ..	10/6
33	J. Gaffney ..	White Leghorn ..	Sunnyhurst ..	15/-

PRICES OF EGGS PER DOZEN FOR SETTING—*continued*.

Pen No.	Owners.	Broods.	Strains.	Price.
34	Mrs. Kynaston ..	White Leghorn ..	Own breeding ..	15/-
35	Bon Accord Poultry Yard ..	White Leghorn ..	Padman—Own breeding ..	10/6
36	*Adelaide Poultry Yard ..	R.C.B. Leghorn ..	Own breeding ..	10/6
37	Mrs. Hobley ..	White Leghorn ..	Wyckoff—Padman ..	12/6
38	W. Elliott ..	White Leghorn ..	Bon Accord ..	10/6
39	*T. W. Martin (late O. James) ..	White Leghorn ..	Slath—Sunnyhurst ..	10/6
40	Sunnyhurst (S.A.) ..	White Leghorn ..	Own breeding ..	21/-
41	G. Bolger ..	White Leghorn ..	Own breeding—Sunnyhurst ..	21/-
42	S. Craig ..	White Leghorn ..	Own breeding ..	10/6
43	O.K. Poultry Yard ..	White Leghorn ..	Own breeding ..	10/6
44	A. M. Thomas ..	White Leghorn ..	Own breeding ..	10/6
45	*Mrs. H. M. Kelley ..	White Leghorn ..	Own breeding ..	10/6
46	*Mrs. H. M. Kelley ..	White Leghorn ..	Stewart—Bunneman ..	10/6
47	Paddy King & Salter ..	Gold Wyandotte ..	Own breeding ..	10/6
48	A. E. Champness ..	White Leghorn ..	Salter ..	10/6
49	Devine & Migro ..	White Leghorn ..	Own breeding ..	12/6
50	Hillview Poultry Farm ..	White Leghorn ..	Own breeding ..	10/6
51	Ontario (S.A.) ..	White Leghorn ..	Own breeding ..	15/-
52	*J. Stuart ..	White Leghorn ..	Own breeding ..	10/6
53	*White Wings Poultry Farm ..	Gold Wyandotte ..	From imported Stock (Eng.) ..	21/-
54	*R. D. Wilson ..	White Leghorn ..	Own breeding ..	12/6
55	*Craig Bros. ..	Brown Leghorn ..	Own breeding ..	10/6
56	J. W. Buttsworth ..	White Leghorn ..	Own breeding ..	15/-
57	The Elms Poultry Yard ..	White Leghorn ..	Own breeding ..	10/6
58	Mrs. C. F. Schmidt ..	White Leghorn ..	Sunnyhurst—Padman ..	10/6
59	Mrs. Flynn ..	White Leghorn ..	Range—Sunnyhurst ..	10/6
60	Coolgardie Poultry Farm ..	White Leghorn ..	Own breeding ..	10/6
61	Craig Bros. (S.A.) ..	White Leghorn ..	Padman—Own breeding ..	10/6
62	Mrs. Younger ..	White Leghorn ..	Padman ..	15/-
63	J. R. De B. Morrison ..	White Leghorn ..	Own breeding ..	10/6
64	T. Ockerby ..	White Leghorn ..	White Wings ..	10/6
			Padman—Sunnyhurst ..	21/-

DUCKS.

Pen No.	Owners.	Breeds.		Strains.		Price.
1	*Smith & Davenport	..	Indian Runner	..	Own breeding	15/-
2	South Perth P.F. (No. 1)	..	Pekin	..	Small	10/6
3	F. Whitfield	..	Indian Runner	..	Dusting	12/6
4	*South Perth P.F. (No. 2)	..	Pekin	..	Small	10/6
5	Mrs. R. B. Moye..	..	Indian Runner	..	Dusting	15/-
6	Coolgardie Poultry Farm	..	Pekin	..	Own breeding	12/6
7	D. F. Vincent	..	Indian Runner	..	Own breeding	12/6
8	Bon Accord Poultry Yard	..	Buff	..	Own breeding	10/6
9	*F. Whitfield (late Dusting)	..	Indian Runner	..	Dusting	21/-
10	Simplex Incubator Factory	..	White Indian Runner	..	Own breeding	15/-
11	J. Moye..	..	Indian Runner	..	Dusting	15/-
12	White Wings Poultry Farm	..	Buff	..	Own breeding	10/6
13	C. Phillips	..	Indian Runner	..	Johnson—Dusting	10/6
14	C. W. Johnson	..	Indian Runner	..	Own breeding	10/6
15	C. Goddes	..	Indian Runner	..	Own breeding	15/-
16	Greenville Poultry Farm	..	Indian Runner	..	Dusting—Pitman	12/6
17	*Mrs. L. Mellen	..	Indian Runner	..	Dusting—Stuell	10/6
18	Adelaide Poultry Yard	..	Indian Runner	..	Own breeding	10/6
19	A. W. Edgar	..	Indian Runner	..	Adelaide Poultry Yard	12/-
20	J. Robertson	..	Indian Runner	..	Brackebare	10/6
21	H. Carr & Son	..	Indian Runner	..	Own breeding	10/6
22	*G. Thomson	..	Indian Runner	..	Own breeding	21/-

No Guarantee given with Eggs.

All Pens marked * have been left in for Second Test, and were entered in last year's competition.

Freight to be added to above prices per dozen:—

1 up to 300 Miles	..	3d.	301 up to 500 Miles	..	6d.
Over 500 Miles	..	..	..	9d.	..

ROOT ROT.

A. DESPEISSIS.

Communications now and again reach this Department from fruit-growers regarding a mysterious disease which first checks plant growth and causes a yellowing of the leaves; these next begin to drop, and as the trouble gradually becomes more and more noticeable, a crop of half-grown, unripe fruit is left hanging on the branches.

The trouble is not by any means widespread, but is more often prevalent in land which, particularly in the winter, is wet and remains damp and cold well through the dry summer months.

The more heavily-timbered spots not long cleared and still unsweetened and sour are those where the disease more often shows.

The cause is a disease of the roots; the agent is a parasitic fungus of the mushroom kind. Several illustrations which accompany these notes convey a clear idea of the nature and appearance of the fungus.

It is known as the honey agaric, its botanical name being *Armillaria mellea*. Its geographical distribution embraces all parts of the world. In France it is known on the vine roots under the name of *Pounidié*. It occurs in various parts of Europe and America on forest and orchard trees. It is reported in agricultural publications from South Africa, New Zealand, Victoria, and South Australia.

The last two or three particularly wet winters we have had in this State seem to have, in some places, aggravated the disease. Its effect is now causing some unrest of mind on the part of growers who planted trees a few years ago. In order to throw light on the subject and enable growers to better understand the nature and habit of growth of the fungus, I have collected from various authoritative sources valuable documentary evidence which is now published.

Dr. Cleland, Government Bacteriologist, accompanied by orchard inspectors of the Department and the Assistant Entomologist, as well as myself, visited localities where the trees are affected, and some typical specimens of the root parasite are now illustrated.

Some time ago an outbreak of the disease was brought to the notice of this Department from the Blackwood. Specimens of diseased roots were submitted for confirmatory identification to Mr. D. McAlpine, the Government Vegetable Pathologist of the Department of Agriculture of Victoria, and the following reply from Mr. McAlpine conveys much useful information:—

"You will have received my note stating that the diseased portion of the tree you sent was affected with root-rot due to *Armillaria mellea*, and this would explain all the symptoms observed. Not only were the rhizomorphs, or cord-like strands found on the roots, but a little above the butt there was a tufted growth of young toadstools of *Armillaria*, leaving no doubt as to the nature of the disease. It is very prevalent in our Victorian orchards and may attack almost any kind of growth under suitable conditions. I found it very bad on some rose cuttings sent from South Australia which had been grown



Sections of Orange roots with *Armillaria mellea* in various stages of development.

in damp soil, and I am at present carrying out experiments on cherry trees at Doncaster which are dying out from this cause.

It is difficult to treat, but I have succeeded in checking it when taken in time.

Drainage is the sovereign remedy for this disease, since it renders the conditions unfavourable for the growth of the fungus by the removal of surplus water and the aeration of the soil. But the drainage must be carried out on proper lines. I remember a case where both vines and apple trees were affected with this fungus and bush drains had been put in, consisting of brush-wood from wattle-trees. On examining these drains I found that they were just a breeding ground for the fungus and that the dark-brown strands formed a regular net-work. The land was afterwards properly tile-drained and the owner was perfectly satisfied with the result after the dead and dying vines and trees had been removed and the soil disinfected.

But I have known cases where proper drainage had been carried out and yet the disease appeared. This suggests another measure which should never be neglected in planting an orchard, especially where the land has been cleared of timber, and that is to get rid of all dead wood and dead roots in the soil as far as possible. It is a good practice to cultivate the soil by means of a cereal or a potato crop or both and bring all the decaying roots to the surface to be collected and burnt. The more thoroughly the grubbing is done and the more time allowed to elapse before planting the less will be the risk from the rot. I can often trace the beginning of the rot to this source, and I had a striking illustration the other day when digging round the roots of some six-year-old decaying cherry trees to come across some of the original timber, so covered with the network of the fungus as to form a fine herbarium specimen. Under clean and careful cultivation the toadstools do not generally appear, but whenever they do they should be removed and destroyed.

When a tree has died out from this cause what remains of it should be carefully dug out and burnt before replanting and the spot well dosed with Bordeaux mixture or sulphate of iron.

If taken in time and the disease is confined to only a few of the roots, the life of such a tree may be prolonged. Lay bare the roots and remove all those which are diseased, carefully tracing them up to the healthy tissue and trimming away any portions of the collar or butt that are affected. Then apply a liberal dressing of Bordeaux mixture or sulphate of iron to the wounds. Every particle of diseased bark and root should be carefully removed in order to prevent fresh infection and if the source of the original infection can be traced, be it decaying stump or root, then it should be dug out and the soil disinfected. I have performed this operation with lemon trees but I find that in apple and cherry trees the fungus is inclined to go for all the roots and not only those on one side.

At any rate I have found a surgical operation sometimes successful, but the main point is to render this unnecessary by having the land properly cleared of dead and decaying timber and sweetened before planting."

Dr. D. G. Williams, District Medical Officer of Bunbury, who some years ago planted an orangery on a piece of fine red gum land consisting of a brown heavy loam of good depth close to the Harvey River, has favoured this Department with full notes concerning his experience with root-rot. These notes

are here published *in extenso*, and describe the appearance and treatment of the disease:—

"In September, 1902, I cleared twenty acres of virgin land and planted 1,600 orange trees at Harvey ten acres of which being exceptionally heavily timbered, chiefly with red gum. It was on this block that 80 per cent. of the disease about to be described occurred. In all I have planted thirty acres. and the less heavily timbered the ground the fewer the trees affected; because in such spots there are fewer roots left behind in the ground which, in decaying, are injurious to the trees. This lightly timbered class of soil looks at first much poorer than the heavily timbered, but in reality healthy oranges thrive just as well in it as in the richer soil, and are less likely, for reasons already stated, to contract the root disease.

"In the autumn of 1904 my attention was called to certain trees which were doing very badly. The foliage was a bright yellow and falling off, some were in bud or blossom; there were 15 or 20 of such scattered about all on the one 10 acres. The position in the orchard made no difference, there were sick trees on high dry undulations and low wet parts. In fact, I may here mention that the highest, driest, and deepest soil in the whole thirty acres was the spot where the disease was most severe; and the lowest lying part of the block, which was cleared of spearwood—quantities of which are still growing on my neighbours' block over the fence—is where the *Washington Navels* bear their richest, largest, and heaviest crops.

"I sought advice about the sick trees and on exploring the roots the bark was found to be rotten, and the rot had spread up on to the bark proper of the trunk in various degrees of severity. My advisers, one and all, said it was 'collar rot,' or 'too deep planting.' We afterwards found that planting had nothing to do with the cause of the disease, although higher planted trees had a better resisting power. The treatment advised was cutting back the tree, scraping away rotten bark, and painting with various fungicides—carbolic acid, sulphate of copper solution, Paris green, Bordeaux mixture, covering denuded parts with cow dung and clay, deeply forking and dressing surrounding soil with sulphate of copper, known in commerce as bluestone, or superphosphates, or any other manure which the adviser fancied. This treatment was continued on till June, 1905, when it was found that the first treated trees had relapsed; and I also awoke to the fact that instead of only a few trees being affected there were between 350 and 400.

"With the object of making further research I determined to dig up a tree, tracing all its roots to their terminal endings. To do this a stake was driven into the ground to which the trunk of the tree was attached, so that all parts should remain in site when the earth was removed. This was done and every root traced out to the tip.

"The appearance of the affected trees varied according to the extent to which the mischief had gone.

"In a slightly affected tree, that is to say where the disease is just starting, the leaves of the tree at the ends of the branches lose their healthy, dark green, and become yellow. This yellowness of the leaves spreads through the whole tree and any tyro can then see that there is something serious the matter. The tree rushes into blossom, which, with the leaves drop off, leaving a black skeleton; or fruit may form, and hanging on longer than the leaves, presents an object lesson not to be forgotten. The yellow fruit, hanging to the black-



Rose bush showing *Armillaria mellea* on the roots.

ened branches of the leafless tree, induces a feeling of desolation in the heart of the most casual and disinterested. What then must be the feelings of the owner to watch five years' labour slip away, this, the result of all his care, hope, and toil?

"The bark of the trunk at earth level will only be affected in trees far advanced, perhaps too far advanced for any treatment. On removing the earth from round the tree the bark is seen to be covered often with a white fluff similar to that seen on a mouldy pot of jam. Whether that is present or not, the bark itself will be found to be soft and rotten, with a scent like mushrooms. This condition of the bark may be all round the trunk, and three or four inches in height, in which case the tree is hopelessly affected. But if on the other hand there can be found a strip of healthy bark that tree may be saved. The method of doing so will be described later.

"Where the disease has attacked the bark of the trunk the diseased roots in some cases all of them, in other cases some of them, will be found affected from their junction with the tree to their terminal ending. The bark of the root will be softened, thickened, and parted from the fibrous root so that it may be stripped off by pinching it with the fingers and drawing the fingers along the root. The thickening of the root bark becomes more marked as we descend towards its termination. When near the end where the fibrous root is only the thickness of a goose-quill the bark will be found to be anything from a quarter of an inch to an inch thick and covered with the white fluff—a vegetable fungus—both outside and also running through its texture; the fibrous root being quite separated, in fact lying in a tunnel in its bark. It also has the mushroom smell described before.

"In every case where this disease was found the roots when traced to their ending came into contact with the rotten and rotting roots of the original trees that had been cleared to plant the orange trees, chiefly red gum. These red gum roots were found rotted into a pulpacious mass of yellowish jelly-like matter through which the fibrous parts of the root ran. So that, if a root in this condition, say for argument's sake, of a foot long, was taken in each hand it could be twisted without effort, and the soft material squeezed out from the more fibrous parts. All this material has the mushroom smell and the white fungoid in great quantity. Exposure to the sun and air rapidly dried up the whole mass leaving the fibrous parts dry, shrunken, tinder-like, and easily burnt. I am now describing roots up to as thick as a man's wrist, which had reached this shape in four years. Thicker roots, say 18 inches in diameter, would only be rotted in exactly similar manner to a depth of a couple of inches.

"Where the tree is severely affected cut it right back with a small hand saw to where the main branches start from the parent trunk, leaving a couple of inches of each branch above the bifurcating point of the trunk. Place a strong stake 6 inches in diameter firmly into the ground and tie the trunk firmly to it with sacking. Follow down every diseased root to the place where the rotting gum roots are lying, and remove them. Saw off every rotten root close to the trunk of the tree. With a knife cut away all diseased bark from the trunk.

"Having arrived at this stage the operator will find that he has dug a hole about 12 feet in diameter and anything from 18 inches to 3 feet deep. Paint the base of the trunk laid bare by the removal of the roots with Bor-

deaux mixture four times stronger than that generally in use, and also paint the raw surface where the branches were cut away. Lime and sulphur all the removed earth and fill up again.

"All this work was started in the late winter, as it is then that the disease is most pronounced, and was continued on through the summer; 90 per cent. of the trees so treated recovered.

"When a tree is slightly affected it requires considerable skill to detect the yellow appearance of the leaves; but the experienced and practiced eye will pick out trees which to the casual observer are perfectly healthy. Again, when removing any decayed gum roots that are lying midway between rows keep a sharp watch for the terminal endings of roots of neighbouring trees, and trace up and remove any that may be diseased. When examining a suspected tree, walk carefully all round it, and on that side on which the top leaves are showing yellow and the remaining leaves are comparatively less dark green than the rest of the tree will be found the diseased root. The root of a tree so slightly affected will never be diseased in its total length; but must be traced carefully and without injury along the healthy part until the unhealthy part is reached, then remove the decaying gum root and cut off the decayed part. Paint the stump of the root, treat the removed earth with lime and sulphur and return. We treated 200 trees at all times of the year as described without losing any or even checking their growth.

"Those trees first treated in 1904 relapsed and were given a second treatment in the new way subsequently adopted in 1905, others later in 1906. Most of these trees, in spite of the fearful handling they received, recovered and have fruit on this year. In every case we found decaying gum roots, and in no case where these were removed has a tree relapsed; many have been done three years and look as well as any other trees in the orchard.

"In the case of one tree all the roots were badly diseased, not having an atom of healthy bark; the tree was four years old and had roots 12 feet long; they were all sawn off level with the ground line and the butt of the trunk, some four inches in diameter, held upright by a stake as before described; it was replanted and is now growing vigorously. The raw surface of the trunk was placed at ground level and the earth heaped up the trunk, new roots formed and the heaped up earth was removed six months later, when the new roots could be seen running downwards in every direction. This is not an isolated case in our experience, but is the only one in which outside evidence could be called.

"In conclusion, it is evident that in the decaying gum roots in my orchard a fungus spore developed, the mycelium of which attacked the roots of the orange trees to travel up to the light and air where a large brown fungus, its flower, develops where the trunk of the orange tree meets the earth. The fungus flower appears in late winter and early spring. In walking through the orchard at this period of the year a group of such fungus, isolated between rows, may be seen and directly under them, at a shallow depth, a rotten gum root will be found; they may also be seen on roots cut across by a drain. The reason this curse does not appear earlier in an orchard is that it takes the gum roots several years to rot into this state. A root as thick as a man's wrist will be completely disintegrated, so that it may be twisted up without effort. Larger roots will only be decayed to the depth of an inch or so, according to their size. Prevention of the disease is simple. Drainage, I believe,

with pipes by admitting oxygen and air, would prevent this peculiar form of degeneration. The digging of drains would bring to light many overlooked roots which could be removed. Country ring-barked for five or six years would be probably free of all but the larger roots. When planting in any country make sure there is nothing that will decay within reach of your trees. Let every tree be planted in the centre of a spot in which the earth has been dug over to the extent of 12 feet in diameter and three feet deep, and from this excavation every scrap of root and rubbish must be removed and the whole well manured and returned.

"Throughout this article the words 'gum root' have been used, but we found banksia roots in the same condition and causing the same trouble."

Dr. J. B. Cleland's examination of the diseased trees corroborates the information already given, as follows:—

"With the onset of winter rains the reproductive part of the fungus has also appeared. This consists, as the photographs show, of mushroom-like bodies growing from numerous areas on the affected roots where these roots reach, or approximate to, the surface. They appear first as little white swellings, bursting often in a mass together (a condition known as *cœspitose*) from the root; these soon show a swollen upper head end which gradually enlarges and becomes of a yellowish or honey colour. So far the gills on the under surface of the cap or pileus have been covered by a delicate membrane; this, however, finally ruptures, the cap expands, the gills are disclosed beneath the cap, and the membrane or veil as it is called is left as a ring on the stem. The adult pileus or cap may be an inch or more across and the fungus usually grows massed together, and may be detected round the base of affected trees. On the gills referred to the spores or reproductive bodies (of very minute size) of the fungus are borne in incredible numbers, and the object, of course, of this stage of the parasite appearing above ground is to disperse far and wide by means of the wind and other agencies these spores or seeds. Blown, then, by the wind or carried by human agency, some, perhaps very few from each plant—fortunately never even a tithe of those produced—reach a suitable nidus for growth—a root, etc.—and there germinate. That is, a delicate cellular tube, the hypha, develops and extends along the tissues of the root. It multiplies and its cells divide again and again, obtaining food for growth from the root tissues they invade, until finally a dense mass of interlacing filaments or hyphæ extend through the bark and cut off the supply of nutriment to the tree. These hyphæ extend then along the root and so to the base of the stem and to other roots, finally ring-barking the plant which straight-away dies when the root-bark is found rotted from the deeper wood. Supposing the roots of the affected tree approach close to those of another living tree, the fungus may extend to this and the dead roots of eucalypts such as the red gum and other trees, extending over many feet of ground, will form excellent conduits for the fungus to grow along. Not only in this way but also by the direct transference of portions of diseased bark by means of implements and so on to the neighbourhood of healthy trees, may the danger be disseminated."

A chemical examination of the soil was thought desirable in order to more particularly ascertain to what extent the land infected with the rodstools was sour, and how it stands in regard to lime and to iron.

Conclusions.

For the information of such who may not have time to read the opinion of those who have contributed to throw light on the root-rot disease caused by the parasitic fungus, the following advice may be thus condensed:—

Root-rot is the result of the attack of destructive parasites of the mushroom family. The one illustrated more particularly under notice in this State is the honey agaric (*Armillaria mellea*).

It may attack almost any kind of root growth. The conditions suitable for its development are met with on badly drained soil. Fruit and ornamental trees when attacked can be treated when taken in time.

Clear the land thoroughly of roots and timber; they carry the fungus.

Drain the land if necessary; bush drains aggravate the trouble.

It is advisable in localities likely to carry the fungus to grow a crop or two of cereals, potatoes, etc., before planting fruit trees.

On infected land it is not advisable to grow a crop of peas for ploughing in green as the fungus might grow on the decaying vines and propagate the disease.

Ploughing and frequent cultivation prevent the toadstools expanding on the surface of the ground.

Remove and burn badly affected trees.

Do not replant young trees in the holes thus left vacant unless the soil has been thoroughly disinfected.

On slightly affected trees bare roots carefully, remove diseased roots, dress with such fungicides as Bordeaux mixture, sulphate of iron, Jeyes' fluid (one ounce to a gallon of rain water). Disinfect the ground by means of a dressing of lime, of sulphate of iron—2 to 3 cwt. to the acre—Jeyes' fluid, or some kind of cheap and efficient disinfectant. Fertilise liberally with Thomas's phosphate preferably. Disinfect tools and implements used in cultivation; they at times carry the disease.

NANGEENAN STATE FARM.

The Minister for Agriculture (Hon. Jas. Mitchell), accompanied by Sir Walter James, K.C., Mr. John Drummond, and the Under Secretary, paid a visit to the Nangeenan State Farm on June 19.

Going from Northam by the Great Southern Railway, with the exception of odd patches at infrequent intervals, the entire frontage to the line was found to be under crop, and as the result of the recent rains, the poorest of the fields was in a thriving condition. The flat country around Kellerberrin presented an almost unbroken vista of cultivation, spreading away on every hand. By the visitors this was regarded as the more inspiring, in view of the old-time theory that the lands of the State were patchy, and that the sand plain inevitably recurred at every few miles.

At the Nangeenan State Farm was found much of interest (says the *West Australian*), and a great deal that was essentially gratifying not only to the Minister but also to the ex-Agent-General and to the merchant. There were in all 333 acres under crop, the bulk of which consisted of wheat of different varieties. All the wheats were found to be well grown, and in forward condition, but 150 acres of Alpha appealed even to the lay members of the party by its striking development. Presenting an unbroken expanse of a deep green, it looked as though it would be ready for haymaking by the end of September. Whether it be cut for hay or for wheat, it was giving every promise of being a very early crop. Altogether there were 301 acres of wheat, and in all probability the crop would bear comparison with any other wheat crop in the State.

In addition to the wheat there were inspected by the visitors 10 acres of peas and wheat for ensilage, 6 acres of turnips for sheep, 4 acres of English barley, 3 acres of Cape Barley, 2 acres of skinless barley, and one of rye. All these plots were looking well, the English barley being of very fine growth. The turnips were something in the nature of a revelation. Twenty-five sheep and a dozen lambs have been put in on one acre of these nutritious vegetables, and by way of experiment the Minister has instructed that the number of ewes and lambs be increased to 100, confidently anticipating that the plot will carry them until the grass is really good again—a period of probably six weeks. This single acre of turnips was sown on February 27, and had two waterings from the goldfields supply. Other experiments with lucerne, potatoes, and mixed vegetables are being conducted along similar lines of early sowing and initial artificial watering to take the place of early rains. So to speak, the rainfall is by these means augmented to admit of early sowing, but with a view to restricting the scope of the experiment to a practical commercial basis the goldfields water supply is used only for the germination of the seed, the development and growth of the plant being left to the natural rainfall. The result is that with a sparing use of cheap water a fine crop is obtained two months earlier than could be expected under natural conditions. Thus the turnips referred to are fully matured, whereas other turnips in the district are as yet scarcely above the ground. The potatoes also have done very well, notwithstanding that the seed is said to have been of but indifferent quality. Altogether the results have been most encouraging, and the experiment of producing early—and late—vegetables with the aid of goldfields water at 9d. per 1,000 gallons will be further prosecuted.

A highly important experiment brought to the notice of the party was one being conducted under the direction of the Government Analyst. It consists of the sowing of five acres of sand plain with leguminous crops in the shape of peas and lupins. One half of each of these crops has been inoculated with bacteria cultures with a view to noting the effect on the wheat with which it is proposed to sow the entire five acres next year. This experiment is being made in accordance with the nitrifying theory in respect to wheat cultivation as enunciated by Professor Bottomley during his visit to Western Australia some three years ago. If the experiment proves successful, it will ultimately result in the turning to good account of millions of acres of sand plain in the State.

In accordance with the Minister's instructions, the system of fallowing has been introduced on the farm, and to date an area of 40 acres has been

finished. Clearing is proceeding satisfactorily, and with the completion of existing contracts there will be 640 acres of cleared land on the farm.

The stock on the farm is not as good perhaps as the Minister could desire. The cattle are relatively poor in condition, and the sheep so far from being pure bred are but a mediocre lot. Still, they are said to be profitable, and as Rome was not built in a day, it must be borne in mind that it is intended to replace them with pure stock. More encouraging are the occupants of the pig yard. Here are a couple of English-bred Berkshires, and half-a-dozen youngsters, the boar being one of the best in the State. Mr. Mitchell is ordering 10 or 12 more sows, his idea being to improve the herds throughout the State by the distribution of pure stock. The ensilage stacked in November last has opened up in splendid condition, and is now being fed to the cattle. Naturally, it discloses a little more waste than would be the case with a tub silo, but, like most other things on the farm, the stacking was done by way of experiment—an experiment that must be regarded as highly successful.

Leaving the farm, the party was driven round the district by Mr. F. Growden, the pioneer settler. The acreage held by the men comprised in the special settlement scheme instituted by Mr. J. M. Hopkins, when Minister for Lands, has been increased, with the result that the prospects are brighter, and those who have stuck to their holdings are now in the way of becoming successful farmers. Of the "outside" settlers visited, all appeared prosperous, and certainly none were found ready to strike the pessimistic chord. Avowedly contented with their lot, they appeared to be doing well, and were using their best endeavours in the steady improvement of their holdings. To those who were visiting the district for the second time, the substitution of a substantial class of farm houses for the temporary structures of earlier days was especially noticeable. On Mr. Ripper's farm at Woolandra, was seen the unusual spectacle of a team of six bullocks yoked to the plough. They were doing their work well, and the owner claimed for them quite a flattering number of advantages over the horse.

NANGEENAN STATE FARM.

Mr. J. Robinson reports for the month:—

"I beg to state that the season is turning out very favourable to the wheat growth in this District.

"The wheat crop is coming on very well, and promises a big yield, provided that the close of the season is accompanied by a few necessary showers. Some of the crop is 12 inches high at the present time.

"The frosts have been very severe, and naturally retarded the growth of the grass and other stock feed.

"The fodder crops are coming along all right, but a few fine warm days would be advantageous.

"The fallowing is making good progress, and already there are about 70 acres turned up—mostly new ground.

"The work now in the course of operation is fencing the newly cleared fields north of the railway line, and the fallowing, ringbarking, and clearing of the fields by contract. The whole of the work is being done in a good and lasting manner.

"The sheep are lambing satisfactorily, but they have to be attended to regularly, as the crows are very destructive to the newly dropped lambs. The birds are too wary to take some poison. Already a large eagle has been poisoned, but the crows will not touch the same baited lamb that caught the eagle."

CHAPMAN EXPERIMENTAL FARM.

MONTHLY REPORT FOR JUNE.

Mr. A. G. White, Manager Chapman Experimental Farm, reports for the month of June:—

The seeding operations for the season as regards the main crop were completed on the 5th of the month. There are 240 acres sown to date. The crops sown are as follows: 148 acres wheat (14 varieties), 16 acres Algerian oats, 31 acres malting barley (3 varieties), 12½ acres of Cape barley, 2 acres of skinless barley, 5 acres rye, 7 acres rape, 13 acres turnips and swedes, 3 acres mangels, and ½ acre Indian gram.

In addition, the 5 acres of experimental plots for reclaiming the sand-plain country, laid out and sown as directed by Mr. Mann, the Government Analyst, have been completed.

Generally speaking, the season is good, though not as mild as the previous season. There have been two or three of the heaviest frosts experienced in this district for years, and in consequence the growth of vegetation is somewhat backward.

The imported cross-bred ewes, which started lambing on 15th May, finished lambing during the month. They are an exceptionally fine lot of lambs, but unfortunately the ewes were low in condition and weak, and consequently could not do full justice to the lambs, and required constant attention. They are now on the early crops, and doing remarkably well. Later they will be put on to the turnips and rape.

The farm cross-bred Shropshire ewes started lambing on the 14th of the month, and are still lambing. These are in splendid condition, and the lambs will have every chance.

The stock generally are looking very well, though the feed is short and lacking in nourishment.

It is at this time of the year that the Dexter Kerry cattle most clearly demonstrate their hardiness and prove how excellently they can adapt themselves to circumstances as regards feed and climate. There is no doubt that they excel in these respects as well as that of docility.

The pure-bred Shropshire ewes are in splendid condition, and it is in fact a difficult matter to keep them otherwise in this district. They will not lamb till late.

Clearing is going on satisfactorily, and there should be sufficient land cleared in time to fallow it in order to complete the 300 acres, as directed by the Minister. Fallowing started on 6th, and 65 acres have been completed up to the end of the month.

TAMMIN SPECIAL SETTLEMENT.

The following report, dated 13th June, was submitted by the manager, Mr. J. Robinson:—

Fifteen miles North of Tammin there is a large bald rock of solid granite. At the foot of this rock, at the South side, a dépôt is now being established for the furtherance of the Special Settlement scheme promoted by the Hon. the Minister for Agriculture.

I beg to advise having left Perth on the 4th June, 1908, by the express for this dépôt. Twelve blocks of the selected area were surveyed and available for the first batch of men, most of whom reached the spot a day or so earlier. After having a look round, they at once proceeded to get in touch with their respective blocks. *One and all expressed their extreme satisfaction at the nature and quality of the soil*, and they have set to work with a will to cut straight tracks to their individual blocks. This work is absolutely necessary as the timber and ti-tree thickets are—although indicative of first-class land—impossible to drive through until a clearing has been made along each line of road boundary, and when it is borne in mind that each block frontage means at least one mile, it will be seen that there is a great deal of track-making to contend with.

The season, so far as I can ascertain, has been very promising, the rainfall having, up to the present, reached nearly 8 inches from the beginning of this year.

The crops on the road out from Tammin are very good and promise a bountiful harvest, some of them having covered the ground, which at this early stage, to my mind, is very satisfactory.

SHIPMENT OF STOCK TO EASTERN STATES.

The Chief Inspector of Stock (Mr. R. E. Weir) reports:—

I have to inform you that advice has now come to hand that stock may be shipped to the Eastern States from the port of Fremantle, on the following conditions:—

South Australia.—Racehorses and other stabled horses may now be imported.

Victoria.—Horses and dogs under conditions specified hereunder:—That all horses and dogs imported from the port of Fremantle will be allowed entry on production to the Inspector of Stock at Melbourne of—(a) declaration from the owner stating that such horses and dogs have not, during the preceding six months, been further North in the State of Western Australia than the twenty-seventh parallel of latitude, and that such horses and dogs have been regularly stabled, or kennelled, and groomed during such preceding

six months, this declaration to be endorsed by the Chief Inspector of Stock. (b) A certificate from the Veterinary Surgeon in Western Australia, approved by the Government of Victoria, stating that he has examined such horses or dogs, and found them all in good general health and exhibiting no sign of surra, trypanosomiasis, or tick infestation, this certificate to be also endorsed by the Chief Inspector of Stock. That such horses and dogs be examined before removal from the ship at the port of Melbourne by a Veterinary Surgeon approved by the Government of Victoria, and a certificate obtained from him that they are in good general health, and exhibiting no signs of surra, trypanosomiasis, or tick infestation. The names of Mr. J. L. Burns and myself have been submitted as the Veterinary Surgeons to be approved of by the Victorian Government.

New South Wales.—Horses and dogs may now be imported but same must be accompanied by a declaration by owner, endorsed by the Chief Inspector of Stock for Western Australia, that such animals have never been North of the twenty-seventh meridian in Western Australia, and by a duly qualified veterinary surgeon's certificate as to freedom from infectious and contagious diseases.

FRUIT-GROWING INDUSTRY.

MEETING OF FRUIT-GROWERS' ASSOCIATION.

The first annual meeting of the Central Fruit-growers' Association was held on June 30 in the lecture room of the Department of Agriculture, Mr. M. F. Jacoby presiding. The Premier, Mr. N. J. Moore, was also present. Addressing the members, Mr. Moore referred to the rapid progress the fruit industry was making in this State, and which it was the policy of the Government to foster. The industry was assuming such dimensions that its future depended on the successful exploitation of outside markets. He said the State had done a great deal to assist fruit-growers in many directions, and its efforts for the distribution of the parasites of orchard pests had been very successful, as well as the provisions made for the inspection and grading of fruit for export. He thought that it would be a distinct advantage at all agricultural shows if the judges stated clearly upon the award cards the reasons for their decisions, and the defects they noticed. Reference was made to the importance of encouraging the production of soft woods for the manufacture of fruit-cases, which would be both profitable and a benefit to fruit packing. He also thought that the quality of our grapes gave much promise of a substantial export trade in that fruit. The Premier, in conclusion, trusted the Association would prove of value to fruit-growers and tend to promote the industry in Western Australia.

Mr. Jacoby, in his address, said the area of land planted out in orchards up to 1907 totalled 12,517 acres, and it was probable that an additional

2,000 acres would be planted out this year. He thought they could look forward to the future of the industry and export trade with high hopes. Prices realised for Western Australian apples in the London market had never realised less than those from the Eastern States, and had generally ruled from 2s. to 3s. per case higher. Mr. Jacoby pointed out the need for some amendment in railway freights and a more satisfactory method of marketing fruit in Perth.

The following office-bearers for the ensuing year were elected:—Mr. M. F. Jacoby (president); Messrs. W. Reid, W. Harper, W. Sanders (vice-presidents); Messrs. T. Price, A. Sanderson, A. H. B. Newman, G. Walter, R. Cowan, H. T. Haynes, H. T. Palmateer, N. J. Cox, G. Hester, J. Duce, T. James, and Dr. Thorp (committee); Mr. A. Barratt (secretary).

FRUIT EXPORT TO GERMANY.

The Agent-General (Mr. C. H. Rason) has forwarded to the Department a letter addressed to him by Messrs. Lohmann & Co., of Bremen, on the importation of Australian apples for the German markets. The firm enclosed a copy of the "*Hamburger Fremdenblatt*," an influential evening journal, containing an article on the subject, of which we give a translation. The prize court referred to in the article has been established to secure competent judging of the fruit by experts, and award prizes offered by Messrs Lohmann & Co. for the best varieties.

Article in *Fremdenblatt*.

"Every year at this time, when our local fruits such as strawberries, etc., have not yet reached the market, shipments of fresh apples arrive here by the N.D.L. and German-Australian lines of steamers which are provided with cold storage. Like all other foreign fresh fruit, these apples are offered for sale by the fruit auctioneers, after opportunity has been given to buyers to sample the nature of the fruit, samples of which are exhibited in the fruit sheds. As the varieties of the apples are very extensive and prices vary according to quality, sorting, and packing, the firm of Lohmann & Co., of Bremen, Melbourne, and Fremantle, have influenced their principal apple shippers to send sample lots of their most saleable varieties to Bremen for the purpose of being submitted to a Prize Court.

"The s.s. 'Oberhausen,' which will arrive in a few days from Australia, brings, in addition to other large shipments, 390 cases of apples which are destined for the Prize Court. Three special prizes have been offered for the best shipments, and 13 shippers in Victoria are competing. The conditions of the Prize Court are:—That each shipper sends three lots of ten cases each of the best-known Australian apples according to his choice, and some of our local and larger fruit firms, such as Jacob Godenrath, T. Port, and Roesch & Eggers, have consented to act as judges. The apples afterwards will be offered for sale by auction."

FIXATION OF ATMOSPHERIC NITROGEN.

SOME NEW FERTILIZERS.

Prof. Th. Schloesing, of the University of Paris, thus writes on the above subject:—

Upon the appearance of nitrogen in the field of chemistry and biology some thirty-five years ago, it was given a name (azote) which signifies inability to maintain life, but since then, the more it has been studied, the better is it established that it is indispensable to life. It is true that nitrogen cannot keep up animal respiration, and on account of this fact, by comparing it with the other essential element of the air, oxygen, it was somewhat neglected and relegated to an inferior place.

When chemical analysis multiplied its application, it was seen that nitrogen was present in all living matter, and it was natural to conclude that it played an important part. We find that animals require nitrogenous matter. For instance, a dog when fed on nothing but sugar soon languishes and dies. In the same way a plant when placed under the conditions where it does not assimilate nitrogen under one form or another can scarcely be said to develop. It utilises the reserve supplies of the seed from which it sprang until it exhausts them, after which it remains in a sickly state. Thus we find that nitrogen is necessary for life, and this idea serves to stimulate our interest in this element, and we desire to be better acquainted with its relations to living organisms. Nitrogen is present either in the free state or combined. In the former it constitutes the main portion of the atmosphere, but it cannot be utilised for life in this state, as concerns animals. Animals do not obtain their nitrogen from the air, but from the vegetables which they feed upon, and this leads us to an interesting question as to whether the atmospheric nitrogen can serve for vegetable nutrition. We must distinguish here, however. There are some plants which have the faculty of fixing the free nitrogen of the air. Certain inferior plants such as sea-weed have the same property, but these will not be considered here. As to cultivated plants, some of the vegetables seem to be the only ones which will fix the free nitrogen, but while these constitute a food of the first rank, they are not sufficient. We wish as a food, wheat, potatoes, etc., and also to utilise the beet for producing sugar and alcohol, linen for garments, and others, such as the grape and the tobacco plant. Animals, on the other hand, need barley and corn. In such cases we require nitrogenous fertilizers. No doubt, when deprived of such, they can arrive at a certain production, owing to the use of certain secondary sources of nitrogen by the plant, of which they are always assured. But this production is limited and will scarcely content any other than dispersed and poorer populations. Thus nitrogenous fertilizer is not only useful, but necessary, and to secure all its advantages, it does not suffice to take it in the form of manure from the domain which is cultivated, but it must oftenest be imported under other forms from outside.

Thus we see that nitrogen is indispensable to animals, that it is given them by vegetable matter and that a great part of the latter, in order to reach a sufficient production, must receive nitrogenous fertilizers obtained outside the

farm. Nature offers us great provisions in the guano of Peru and the Chili nitrate of soda, and these have been a great benefit to agriculture in all countries where they are used. But the supply of guano is exhausted, and it seems likely that in thirty or fifty years the nitrate beds will also be used up. Coal is another source of nitrogen. When vegetable matter dies it is usually the seat of reactions which transform it profoundly. Microbes attack it and leave but little. They work very actively and play the part recognised by Pasteur in the world of economy. Without them the disintegration of organic matter by the purely chemical action of oxygen would go on with exceeding slowness. One proof will be sufficient, this being a sample of wheat from Egypt, preserved for ages, coming from the burial place of sacred crocodiles at El Lahoun. They were buried at three feet in the sand without other preservation than the climate of the country, and the humidity of the soil never reached the point where microbial life commenced. Under the action of oxygen, the wheat has only darkened in colour, and keeps its form and consistence. In conditions where coal is formed, the vegetable matter has not perhaps resisted as well, but here we have not the absence but an excess of water, and this gave a certain protection. Instead of consuming entirely and disappearing, as in the soil, it has left an important residue which always contains a good proportion of nitrogen, from one to two per cent. It is this nitrogen which in the treatment of coal by heat gives ammonia, and such is the origin of this production of sulphate of ammonia, which now reaches 760,000 tons. The 800 million tons of coal consumed every year in the world would give much more sulphate if the recovery of ammonia was applied. This cannot be done entirely, of course, but there is no doubt that in this direction there may be a great increase in the production of sulphate of ammonia. This is a source of nitrogen which is very important for agriculture. But even this source has its weak point like the others, in its lack of duration. In a few centuries the sulphate of ammonia from coal will be also lacking, from the exhaustion of the coal beds. But there will be a continued need of fertilizer, on the other hand. This leads us to consider the nitrogen of the air as a source of supply and gives an added interest to the recent attempts to utilise the nitrogen for the purpose of fertilizing.

Two solutions have been given to this important problem. Messrs. Frank and Caro obtained a nitrous compound, calcium cyanamide, which can be used in agriculture, by direct fixation of atmospheric nitrogen upon calcium carbide. Again Messrs. Birkeland and Eyde combine the nitrogen with the oxygen of the air to obtain nitric acid and the nitrates. The production of the calcium cyanamide is as follows: We heat pulverised carbide of calcium to 1,000deg. C. in crucibles in which nitrogen is introduced, and the latter is absorbed, giving the cyanamide. $\text{CaC}_2 + 2\text{N} = \text{CN}_2\text{Ca} + \text{C}$. The carbide used here is the ordinary kind. By observing the pressure in the nitrogen supply pipes we see that it rises when the operation is finished. Using charges of 300 pounds this requires five or six hours. The product is hard and of a blackish grey colour, containing about 20 per cent. of nitrogen, but theoretically it can reach 30 per cent. should pure carbide be used. Under the action of water, this compound gives ammonia and calcium carbonate. $\text{CN}_2\text{Ca} + 3\text{H}_2\text{O} = 2\text{NH}_3 + \text{CO}_3\text{Ca}$. In the soil, the cyanamide is more slowly transformed and finally all the nitrogen passes into the state of ammonia. By being nitrified, it is adapted for assimilation by the roots of plants and thus

is a very useful fertilizer. Trials have been made of this compound on a rather large scale, and although the results are not as yet uniform, it appears that it is equal to an ammoniacal fertilizer having the same percentage of nitrogen. At present steps are being taken to produce it on a large scale. In Italy a plant installed at Piano d'Orte uses 3,000 tons of carbide, and this will soon be doubled. The Société Française des Produits Azotés is erecting a plant in the Savoie region and will use about the same amount of carbide. To obtain the current for the electric process used in preparing the carbide, it uses the stream of Eau Rousse, with a turbine-dynamo station erected for this purpose.

Considering the second process for nitrous products as used by Birkeland and Eyde, it is based on the combination of the nitrogen and oxygen of the air, and a similar method has already been described. Therefore we will not treat of this process at length, except to recall the fact that the air is made to pass by a powerful electric arc contained in a furnace, and the gaseous mixture which comes out contains air in excess and a quantity of nitrous oxide. The temperature of the mixture leaving the furnace is about 1,470deg. F., and that of the arc is near 5,400deg. F. At the new Svaelgfos-Notodden works there will be thirty furnaces in operation, representing a total of 34,000 horse-power. The nitric acid passes into apparatus containing limestone, and forms a nitrate of lime solution, which is then concentrated. The rest of the nitrous gases form nitrites in other apparatus.

The Norwegian Nitrate and Hydraulic Company now control the plants of Notodden and Svaelgfos-Notodden. This relates to the use of the Rjukan fall, which is one of the largest in the country. It will furnish 220,000 horse-power, which can be used for the above process. The company propose to take 100,000 horse-power from the fall by building a first plant half-way up, and the remainder can be used at a later period. A lake of 53 square kilometers will be used as a reservoir in this case, and the water arrives by a tunnel $2\frac{1}{2}$ miles long into the feeding reservoir, from which the penstocks lead to the dynamo house. Here will be located ten Pelton turbines of 12,000 horse-power each. Cables will take the current to the chemical works, which are situated farther on. The products of these great works will be shipped on a special railroad track thirty miles long, and are then transferred to ocean steamers at the port of Skien. This vast enterprise has already been put under way. Joined to the 34,000 horse-power of Svaelgfos-Notodden, the 100,000 horse-power of the new plant will give in all 134,000 horse-power, corresponding to 53,000 long tons of nitric acid, or 90,000 tons of nitrate of lime.

About one-fifth of the enormous quantities of nitrates exported from Chili are used in various industries, especially for explosives, but the greater part is devoted to agriculture. It may be asked whether the newly-produced nitrate of lime is as good as the nitrate of soda which is now in use. Agonomic scientists know that the nitrogen which feeds the roots of plants in the soil takes essentially the form of nitrate of lime, and this leads us to expect a great efficacy from the nitrate of lime when used as a fertilizer. But experiment confirms this. The most recent, carried out in 1906 in different regions in France, is of value as it includes important tests, and its results should inspire confidence. It has been definitely established by widely varying kinds of cultivation on a large scale, that there is a complete equivalence between the same amounts of nitrate of soda and nitrate of lime.

We thus have the two processes which have already appeared for giving a practical solution to the problem of the fixation of the free nitrogen of the air, and this problem is a capital one for the future of agriculture and of humanity. Seeing that the question of nitrogen is so active at present among experimentors, there may arise other processes of the kind, but at present we must consider only those which actually exist, and for the time being we have in Europe only the calcium cyanamide and the nitrate from Notodden. But there will hardly be any struggle between them. In fact, the 760,000 tons of sulphate of ammonia and the 1,600,000 tons of nitrate of soda which are consumed annually represent 415,000 tons of nitrogen, while on the other hand the 15,000 tons of cyanamide and the 90,000 tons of nitrate of lime which will only come upon the market a few years hence, represent but 13,800 tons of nitrogen, or but 3 per cent of the former amount. There will thus be ample room for the new products without making them conflict or enter greatly into competition with the former ones. Later on, when the Chili nitrates have disappeared, the state of affairs will have changed, and we will see a greater competition between the new processes.

On the side of the producers the situation is thus favorable. What, then, do the agricultural interests think of the question? On the appearance of the new nitrate of lime the first idea was that the nitrates would become cheaper in consequence. This has not proved to be the fact, and there is scarcely any reason that the prices will be lowered, seeing that there is always a large consumption of fertilizers, and even admitting the objections made by farmers to the high price of nitrates, they none the less continue to use them, and find it to their advantage.

Although the present paper treats specially of the nitrogen of the air, we may remark a kindred subject, that is, the experimental work of Messrs. Muntz and Lamé upon the production of ammonia and nitrate of lime by their newly discovered method. They extract ammonia from a most common material, peat, which they treat to this end by means of superheated steam. A liquid is thus secured which contains the ammonia in the state of sulphate. They treat this liquid matter in a percolating column in which air is mixed with limestone, and in this way the inventors succeed in obtaining a product which consists of nitrate of lime.

EXPERIMENTS WITH AFRICAN WONDER AND RHODES GRASS.

In the early part of January last Dr E. J. A. Haynes, of "Weetalabah," Hay Street West, Perth, planted in his garden 30 roots of African Wonder Grass which he procured from Messrs. Rossiter & Co, the well-known nurserymen of Hay Street, at a cost of 1s 3d. The roots were set in red sandy soil at a distance of three feet apart, and the plot was not excessively watered. They flourished remarkably well, and by the middle of the following March they measured from 3ft. to 4ft. in height, also sending runners along the ground of a similar



Geo. Hill.
African Wonder Grass (five months' growth) - Dr. E. J. A. Haynes' residence.

length. The weather at this time was exceedingly hot; around the grass plot were pig and watermelon vines blackened by the heat; but the African Wonder stalks, which were as thick as one's little finger, were quite vigorous and succulent.

The illustration on the opposite page shows a measured square yard of growth cut in May; the sheaf is seen standing on the left. The weight of the sheaf was 16lbs., which represents a yield equal to thirteen tons of fodder to the acre, a striking proof of the vitality and productiveness of this famous grass as a summer fodder for settlers in this State; and its great value on that account should be recognised.

Since cutting his experimental crop Dr. Haynes has sown nearly a quarter of an acre with nodes from the plants, and states that despite the frost and unusually cold weather all the cuttings have shot up well, long roots being developed from each node, evidence again of the hardness and adaptability of the African Wonder, even when planted in banksia country.

Dr. Haynes says he has been equally successful with Rhodes Grass. With a sixpenny package of seed he sowed one-eighth of an acre and obtained from it seed equal to thirty shillings in value. He also planted one-eighth of an acre with nodes from the plot, and had sufficient nodes to plant another area of ground of the same extent. He has become a thorough believer in the cultivation and value of these fodder grasses. Instead of growing cabbages and other vegetables on his land at Wanneroo, Dr. Haynes declares it is his intention to put it all down in the prolific grasses referred to above

HORSE-HOOF PARINGS.

At many a smithy may be seen a heap of horse-hoof parings, and these are generally wasted, their value to the fruit-grower not being known. A note in the *Journal of Horticulture* says that these parings form a good manure for fruit trees and vines, and especially on sandy soils where, by their slow decay, they will yield a gradual supply of nitrogen, as 100lb. of hoof contains from 8lb. to 12lb. of organic nitrogen, and from 6lb. to 10lb. of phosphoric acid. For comparison it is shown that 100lb. of bone-meal contains 32½lbs. of organic matter, 24lb. of phosphoric acid, 24½lbs. lime, 11lb. magnesia, and 4lb. of nitrogen. Inferences may be drawn as to the value of hoofs compared with bones. The hoof parings also generally contain a large proportion of manure. Such are best thrown into a heap, say, five or six barrow loads, and sprinkled over with sulphate of potash, and protected from wet. The heap in the course of six months will form a good manure, and may be used in the proportion of about one-tenth of the loam forming the border, say one cart-load of the hoof manure, two cart-loads of old mortar rubbish, one cart-load of unbleached wood ashes, and 2cwt. or 3cwt. of bone-meal, mixed with ten cart-loads of turfy loam. This mixture could not be used to any extent, because the hoof parings would not be forthcoming, but it would answer admirably for many small growers.

GEOLOGICAL REPORT.

PHOSPHATE DEPOSITS OF CHRISTMAS ISLAND.

(By H. P. WOODWARD, Acting Government Geologist.)

Part I.

Christmas Island is a member of the Eastern Group of the Archipelago of the Recherche, which consists of a scattered belt of islands lying along the southern coast between Fanny Cove and Israelite Bay, or more correctly between 120deg. 30min. and 124deg. 10min. E. Long. This Island, which lies about 20 miles in a south-easterly direction from Israelite Bay, is about one mile in length, and averages about a quarter of a mile in width, but spreads out at either end, where bold, bare dome-shaped granite masses rise to an elevation of about 500ft. above the sea level. The central or isthmus-like portion which connects these two is comparatively low, attaining its greatest elevation to the seaward (east), where it presents a perpendicular granite cliff face of about 100 feet to the ocean swell. There is a general fall of the surface to the westward, where the limestone cliffs never exceed 30ft. in height, whilst about the centre of this side a sandy beach extends for a length of about 13 chains. This island forms a conspicuous object, presenting the appearance of two isolated peaks, both of which rise abruptly from the sea, and are visible for a distance of about 30 miles. A few chains from the south-western part of the island is another called New Year Island, which is a low bare granite mass, the two being so grouped as to form a land-locked harbour protected from all quarters but the north-west, which is in the direction of the mainland. So far no fresh water has been discovered upon this island, but it is highly probable that a supply of fair quality can be obtained by sinking to a moderate depth in the sandy hollow near the camp. Firewood is scarce, since the only vegetation consists of scrub of small size, whilst there is absolutely no timber.

The granite rocks which form the foundation of this island are of a highly igneous character, thus differing considerably from many of those met with in the south-western district, which may possibly be of metamorphic origin. They present a bold bare polished surface upon which the foothold is very insecure, often having the appearance of colossal ruins or obelisks. The inclined polished surfaces exhibit a complex structure of dark-coloured biotite granite and gneiss or schists, the foliation of which is much plicated and appears to represent the primary rocks of this group, since fragments and masses of them are often met with entangled in the magmas of porphyritic granite which appears to have intruded at a subsequent period. These porphyritic granites are of a pale flesh colour, the ground mass being composed of quartz, felspar, and mica (muscovite), whilst scattered here and there

throughout the whole are large crystals of orthoclase felspars which vary in size from one-half to an inch in length. Radiating from these porphyritic masses are dyke-like extensions in which the character of the rock changes rapidly into pegmatite, whilst further still from the primary magma these pass almost imperceptibly into quartz veins which occasionally contain a little felspar or mica in the form of large crystals, the latter being mostly biotite.

Intersecting the entire series are numerous narrow veins of highly basic fine-grained greenstones which contain magnetite in such large proportions that even the thinnest microscopic sections are almost opaque. Overlying these granite rocks are a series of limestones and sandstones which were apparently deposited by the action of waves and wind, since the lower members of the series contain boulders of granite cemented together by a dark-coloured shelly limestone. Overlying this shelly limestone is a series of cream-coloured limestones very similar to those met with along the south-western coast followed by a fine-grained sand rock (often ferruginous), upon the top of which is an irregular deposit of travertine limestone which either occurs in the form of layers or nodules often mixed with dark-coloured sandy soil. Two sections of this limestone have proved to be phosphatic, viz., the basal beds of shelly limestone which have been converted into rock phosphate and the surface travertine. In considering the first of these the reason for the presence of phosphoric oxide in considerable quantity is difficult to account for since there is nothing in the character of the rock to indicate bone structure, whilst one would imagine that a beach composed of loose shelly gravel would not be selected by birds for a camping ground and nesting place. The fact remains however that the carbonate of lime which originally formed the shell fragments has been largely transformed into phosphate of lime. The only possible solution being that at some remote period these beds formed cave bottoms in the cliff face in which large deposits of guano accumulated, the soluble phosphates in which gradually acted upon the shelly matter whilst preserving its structure.

The overlying creamy limestones and sandstones are almost destitute of phosphoric oxide, and since any organic structure that may have existed has been entirely destroyed by meteoric agencies their origin is obscure, but in all probability they resulted from blown sands and shelly matter. Upon the other hand the presence of travertine can be easily accounted for by the action of capillary attraction in drawing upwards ground waters which have dissolved portions of the carbonate of lime contained in the underlying sands, these upon nearing the surface during dry warm weather have evaporated leaving behind their burden of lime at first as a thin film which has been added to from year to year until a layer of often considerable thickness has been formed, or when, in the first instance, the deposition has taken place around a particle which has been increased by the addition of thin coats periodically, thus forming nodules which sometimes attain considerable size. Overlying the travertine deposits is a layer which varies considerably in thickness of soil of a dark colour rich in organic matter upon which the salt bush and other vegetation flourishes, and in which numerous penguins and mutton birds burrow and nest. This travertine limestone is as a rule phosphatic, but its value varies very considerably, ranging from brown resinous-like veins or coatings of almost pure tricalcic phosphate down to a hard white vitreous limestone containing scarcely a trace.

The phosphorisation of the limestone has apparently taken place directly from the contact of descending solutions containing soluble phosphates derived from the excrement of sea fowls, the stronger phosphoric oxide having replaced an equivalent of the weaker carbonic acid, thus forming an insoluble phosphate of lime. This chemical change has naturally not taken place by any means to an uniform degree over the entire area, the zone of highest being for the most part confined to those localities where there is a sufficient cover of soil to allow the birds to burrow, whilst those portions where the travertine outcrops at the surface usually contain little phosphoric oxide. This phosphorised travertine covers a total area of 153,600 square yards, and has an average thickness of about 2 feet, and therefore amounts to 102,400 cubic yards, whilst the average thickness of over-burden of sand or soil is 2 feet.

A considerable number of shallow holes have been sunk upon this area, the majority of which were carefully sampled, the results of the analyses of which have been placed upon the plan at each locality. These samples were taken in such a manner as to nearly approach that which would be employed in working these deposits upon a large scale, viz., stripping the over-burden and screening the limestone to get rid of sand and earth; therefore the results obtained do not represent the actual value of the clean limestone*, since a certain quantity of sand and soil adhering to the stone was included. The area covered by the limestone may be roughly divided into three: the first of which is situated at the north and includes a belt upon the cliff tops extending southward towards the camp. In this section it will be noticed that the values in phosphoric oxide are uniformly low, and it in consequence may be excluded from any calculations. The second area, which may be called the central, is situated in a dip near the centre of the Island, and it has been very thoroughly prospected; this I estimate to contain 15,483 cubic yards, of an average value of 13.50 per cent. phosphoric oxide, worth about 34s. per ton.

The southern area has been very little prospected, but what has been done recently is of a most promising character, for not only are the values good, but the deposit is of greater thickness. I estimate that there are 36,000 cubic yards in this section, whilst as far as tested it contains an average of 11.50 per cent. of phosphoric oxide, which would make it worth 29s. per ton; this is probably considerably under its true value since all the trial shafts have been sunk upon the edge of the area.

The rock phosphates on the shore returned the highest percentage of phosphoric oxide, but since it outcrops for only a short distance, the extent of this deposit cannot be estimated, but it probably covers a considerable area beneath the southern section last mentioned. A rough estimate of the outcrop gives about 1,000 cubic yards in sight, of an average value in phosphoric oxide of 23.64 per cent., worth about £3 per ton.

* Analyses of four picked samples, by the Mineralogist and Assayer:—

No. 765 ...	Resin-like substance in rock, Xmas Island	Phosphoric oxide, P_2O_5 , 32.03 %; Calcium Phosphate $Ca_3P_2O_8$, 69.92 %.
No. 767 ...	G.S.M. 8136	Phosphoric oxide, P_2O_5 , 33.67 %; Calcium Phosphate, $Ca_3P_2O_8$, 73.50 %.
No. 768 ...	G.S.M. 8137	Phosphoric oxide, P_2O_5 , 29.67 %; Calcium Phosphate $Ca_3P_2O_8$, 64.77 % encloses large crystals of felspar.
No. 769 ...	G.S.M. 8138	Phosphoric oxide, P_2O_5 , 27.20 %; Calcium Phosphate $Ca_3P_2O_8$, 59.37 %.

The following is a list of the samples with the section of the formation exposed in each hole, and the locality symbol for reference to the map:—

Section.		P ₂ O ₅ Value (Phosphoric Oxide.)	Ca. (PO ₄) ₂ (Calcium Phosphate.)	CO ₂ =	Carb. Lime.
1A	6in. Sand with little limestone rubble				
	12in. Rubbly limestone with sand	10.62	23.18	6.49	14.85
	48in. Sand rock				
2A	18in. Sand and soil				
	15in. Rubbly limestone ...	9.00	19.65	16.70	37.95
3A	18in. Sand and soil				
	15in. Calcareous sandstones Sand rock	6.01	13.12	25.18	57.22
4A	12in. Sand				
	8in. Rubbly limestone Hard limestone	9.94	21.70	19.75	44.88
5A	13in. Sand				
	12in. Limestone Sand rock	12.02	26.24	14.18	32.22
6A	French west end:				
	6in. Sand				
	18in. Rubbly limestone Hard limestone	21.36	46.62	2.86	6.49
	French east end:				
	3in. Sand				
	6in. Rubbly limestone	21.36	46.62	2.86	6.42
7A	East end:				
	36in. Sand				
	24in. Ferruginous limestone Sand rock	14.41	31.46	15.22	34.59
7A	West end:				
	36in. Sand				
	18in. Limestone Sand rock	23.58	51.47	3.47	7.88
8A	18in. Limestone rubble Sand rock	15.89	34.71	9.11	20.70
9A	7in. Soil				
	18in. Limestone Sand rock	4.92	10.74	21.13	48.02
10A	6in. Soil and rubble				
	12in. Limestone Sandy limestone	3.17	6.92	27.95	63.52
11A	15in. Ferruginous calcareous sandstone Sand rock	8.69	18.97	.63	1.40
12A	12in. Rubbly limestone and soil Sand rock	3.00	6.55	26.62	60.50
13A	18in. Limestone rubble and sand	3.33	7.27	7.60	17.27
	48in. Yellow sand				
1B	Limestone outcrop (general)	5.43	11.85	28.75	65.34
2B	12in. Sand				
	6in. Sand and rubble				
	12in. Limestone Sand rock	5.22	11.39	25.90	58.86
3B	5in. Sand				
	12in. Limestone	5.06	11.05	24.12	54.81
4B	17in. Limestone and soil				
	6in. Hard limestone Sand rock	6.23	13.60	23.69	53.84
6B	36in. Sand				
	18in. Sand and rubble	19.55	42.66	2.25	5.11
	6in. Limestone Sand rock				

Section.		P ₂ O ₅ Value (Phosphoric Oxide.)	Cu ₃ (PO ₄) ₂ (Calcium Phosphate)	CO ₂ =	Carb. Lime.
7B	42in. Rubbly limestone	12.86	28.07	.73	1.66
8B	12in. Sand				
	6in. Ferruginous limestone and sand	8.68	18.95	.87	1.97
	Ferruginous sandstone				
9B	24in. Sand				
	42in. Ferruginous sandy soil with nodules	6.37	13.90	.35	.79
	Ferruginous sandstone and grit				
A	18in. Sand				
	30in. Limestone	3.23	7.05	23.50	53.41
	Sand rock				
B	48in. Sand				
	12in. Limestone	11.56	25.24	14.63	33.25
C	36in. Sand				
	24in. Limestone	19.36	42.13	8.04	18.27
	Sand rock				
D	60in. Sand				
	18in. Limestone	17.01	37.13	8.68	19.72
E	48in. Sand				
	18in. Rubbly limestone	16.27	35.52	8.85	20.11
	12in. Limestone				
	Hard limestone				
G	36in. Sand				
	18in. Rubble and soil	12.97	28.23	5.33	12.11
	12in. Soil				
	12in. Limestone				
	Sand				
H	36in. Sand				
	24in. Rubble and soil	11.81	25.78	10.15	23.06
	12in. Limestone				
	Sand rock				
I	9in. Sand				
	12in. Limestone	9.73	21.24	17.13	38.93
	Sand rock				
J	42in. Sand				
	42in. Sandy limestone	9.23	20.17	16.57	37.66
K	48in. Sand				
	30in. Limestone	9.75	21.28	23.66	53.77
L	36in. Sand				
	36in. Rubble and sand	18.90	41.26	.41	.93
M	6in. Sand				
	18in. Limestone	9.17	20.02	21.20	48.18
	Sand rock				
N	12in. Sand				
	54in. Limestone	12.51=	Tricalcic	phosphate	27.32
	Sand rock				
N3	3in. Sand				
	42in. Limestone	15.46	33.74	.70	1.59
21	Shell rock phosphate	23.64	51.61	3.55	8.07
31	General sample from camp to guano caves (cliff)	1.28	2.82	30.50	69.32
36	General sample cliff South of camp	7.79	17.01	20.88	47.45
42	Rock phosphates (roof of guano caves)	1.38=	Tricalcic	phosphate	3.01

(To be continued.)

WOOD DISTILLATION.

A new industry has arisen in Victoria which has an important bearing on the work of clearing and settling forest lands, and finds a channel for turning to profitable use the fallen timber that otherwise goes to waste. This enterprise is described by Mr. A. S. Kenyon, C.E., in the *Victorian Journal of Agriculture* for April, and the reproduction of the article in these pages will, no doubt, afford interesting reading to many in this State:—

Settlement on the land implies the removal to a large extent of the original growths upon it. At times, and in particular localities, the timber may pay for its removal for saw-milling purposes; but as a rule, clearing, and particularly in the south-eastern districts, forms the heaviest and most costly part of pioneering work. The firm of Cuming, Smith, and Co., manufacturers of artificial fertilisers, had, for many years, largely used acetic acid and its compounds in their chemical works. As this acid is produced (to use technical terms) by the destructive distillation of wood, Mr. James Cuming, jun., considered it would be practicable to produce this, as well as other compounds, from the vast forests of Gippsland. A trip home strengthened his convictions, and, as a result, some £40,000 has been spent in establishing wood distillation works at the Yarra Junction, near Warburton. The firm acquired several sawmills, and secured a lease from the Forest Department of about 4,000 acres on the Britannia Creek. A narrow gauge tramway was built connecting the saw-mills with the works, and with the railway. The timber is cleared off in a face, all of value being used for splitting palings or for the saw-mill; the remainder, down to limbs of 3 inches in diameter, is sent to the works. Dead wood is not used, the green living wood being required. It is not likely that the farmer will be able to undertake similar work to clear his land, the initial outlay being too high, yet a somewhat detailed description of the process may be of interest.

Wood distillation in its crudest form is known as charcoal burning. Here only one product, charcoal, is the objective, though very similar methods are used in some countries to also obtain wood tars. In no case, however, can the gaseous products be secured. To obtain these and the solid and liquid products economically, retorts with the requisite condensing arrangements are required. Wood consists mainly of cellulose or woody fibre, and plant juice or sap. These are composed of carbon, hydrogen, oxygen, nitrogen, and a small amount of mineral matter. Under the influence of heat in the absence of air, that is, in a closed vessel or retort, the cellulose and other matters are broken up, and new compounds formed, depending upon the degree of heat and the rapidity with which it is brought to bear on the vessel; a great deal also depends upon the care and skill used in applying the heat to the retorts.

The works themselves consist of a large shed for stacking the cut timber to permit of thorough drying, an operation occupying 6 to 12 months; retort and condensing house; laboratory and the usual residential buildings. The timber is brought down on the tramway, stacked, and, when sufficiently dry, that is, with only some 10 per cent. of moisture, it is loaded on to trucks holding 3 tons each of green wood, equivalent, when dry, to a little over 2 tons. Four of these trucks constitute one charge for a retort, aggre-

gating some 9 tons of dry wood. The trucks are run on to a cage-like traverser on rails, which is shaped to almost exactly fill the retort. The latter is a cylinder 46 feet in length, set in brick work like a boiler and heated in the same manner. Opposite to the retorts are the cooling chambers. These are identical in size and construction with the retorts, except that they are not built in. After the operation of distilling is complete, the door of the retort is opened and the traverser, a cage full of red hot charcoal, is rapidly run across into cooling chambers, and the doors closed to prevent the charcoal burning away in contact with the air. Streams of water play on the chambers to hasten the cooling process.

To return to the retorts; after the load is run in, the doors closed and luted up with clay to prevent escape of gases, firing is commenced, gently at the start, and harder towards the end, to get the right percentage of charcoal, which amounts to about $2\frac{1}{2}$ tons per charge. The process occupies about twenty-two hours for dry, and up to thirty-six for green wood. The charcoal is practically pure carbon, the percentage of ash being about .5. From the retort the gases resulting from the distillation are sucked out by a fan or blower, there being a pressure to overcome in the tar separator. The gases go through a trough which has a system of water-pipes to keep the temperature down to about 150deg. C. The tars separate at this temperature, and are collected in a copper separator, from the lower portion of which the tar flows continuously. The more volatile gases containing pyroligneous acid (the acetic acid group), wood naphtha or methyl alcohol, acetine, and a host of minor compounds of little value, are passed through a condenser, and the condensed liquid run into vats. These contain partitions for separating the wood oils distilled over, the heavier sinking to the bottom, and the lighter floating on top of the aqueous solution of wood naphtha and pyroligneous compounds. They are drawn off and run to the tar distillery, a cast iron kettle holding some 360 gallons of tar. The tar distillation secures some more acetic acid still remaining in it, and yields various oils such as creosote, well known as a metal and timber preservative. The volatile gases remaining unliquefied in the condenser are passed through scrubbing columns filled with coke and dripping water to extract any remaining wood spirit. After this the gases are still of use to burn for heating purposes. When everything is working well, these gases are almost sufficient to supply all the heat required for the retorts, very little other fuel being needed. The water solution of wood spirit, etc., is run from its vat into neutralizing vessels. These are fitted with circular stirrers. Lime is put in until the free acetic and other acids are neutralised, and form lime acetates. From the neutralising vessels the liquor is run into a sump where the heavier impurities in the lime, clay, sand, etc., are allowed to settle. It is then pumped through a filter press and raised to a de-alcoholizing or rectifying column, where, owing to its low boiling point, 55deg. C., the methyl alcohol is separated. The methyl alcohol product is kept at between 80 and 90 per cent. strength. The solution of acetate of lime is concentrated almost to saturation, using the waste steam from engine. It is then dried by blowers and rotary driers, producing grey acetate of lime in a dry state. From this either commercial or glacial acetic acid is produced by heating in a cast iron vessel with strong sulphuric acid.

This covers the present scope of the operations, but additions are contemplated to separate acetone for local use or for export. Acetone is a

powerful solvent, and forms a most important constituent in some of the more recent high explosives used in warfare. From acetone, chloroform and iodoform are also derived. There is also a possibility of further by-products such as creosote compounds for wood, etc. The products of one ton of dry wood are:—

90lbs. acetate of lime, equal to 25lbs. glacial acid, worth 1s. 1b.

25lbs. methyl alcohol at 6d. 1b.

70lbs. Stockholm tar at $\frac{1}{2}$ d. 1b.

5swt. charcoal at 1s. 6d. cwt.

equivalent to over £2 per ton in value.

The chemical portion of the plant is under the charge of Mr. Renckhoff, and the system adopted is that of F. H. Meyer, Hanover, Hainaults. About 200 hands are employed with a monthly wages sheet of over £1,000. The works were commenced in August, 1906, and are not yet in full working order.

Every success must be wished such an important industry. The turning of practically worthless timber into products worth over £2 per ton is only accomplished by a large expenditure on labour, and, practically, on labour only. The advantages of manufacturing our own explosives are very great, although it is hoped we will not fully appreciate this side of the question for a considerable time. Such districts as the Otway and Heytesbury forests are peculiarly suitable for such industries, and with the assurance of profit from similar works large areas might be rendered available for the settler. In those localities, there are large stretches of grass tree country; the grass tree (*Xanthorrhoea Australis*) contains large percentages of sugar, varying from 10 to 18, and from these alcohol might be obtained by fermentation and direct distillation. There are other possibilities in the utilisation of our apparently worthless forest products, and farmers generally will watch with interest the developments in this way.

SCAB IN POTATOES.

Cause and Prevention.

The following notes are from a report of a series of trials and investigations made at the Maine Agricultural Station:—

The use of untreated seed and the too common practice of reserving unsaleable, scabby tubers for planting may result in a rapid increase of potato scab.

Scab is caused by a minute parasitic fungus. Soil conditions, the application of lime, ashes, chip dirt, etc., may favour the development of scab, but are incapable of causing it.

Crop infection on old land may come from the soil, from the seed, or from both. On new land the source is largely from undisinfected seed.

Alkaline soils, the use of stable manure, lime, ashes, and certain chemicals of an alkaline nature favour the fungus. Acid soils and certain other chemicals are unfavourable to it.

Beets and the roots of a few other vegetables are attacked by the disease, but the fungus may persist in infected soil for several years without the presence of known host plants.

Badly infested soils should be devoted to such crops as grains, grasses, and clovers for as long a time as possible. Fertilisers favourable to scab should be avoided, and "souring" the soil by green manuring is recommended.

On clean soils only healthy, disinfected seed tubers should be used. Manure containing uncooked scabby potatoes or refuse should be avoided, but no other precautions as to fertilisers are necessary. Clean soil may be infected by means of tools, bags, baskets, etc., which have been in contact with infected land or tubers.

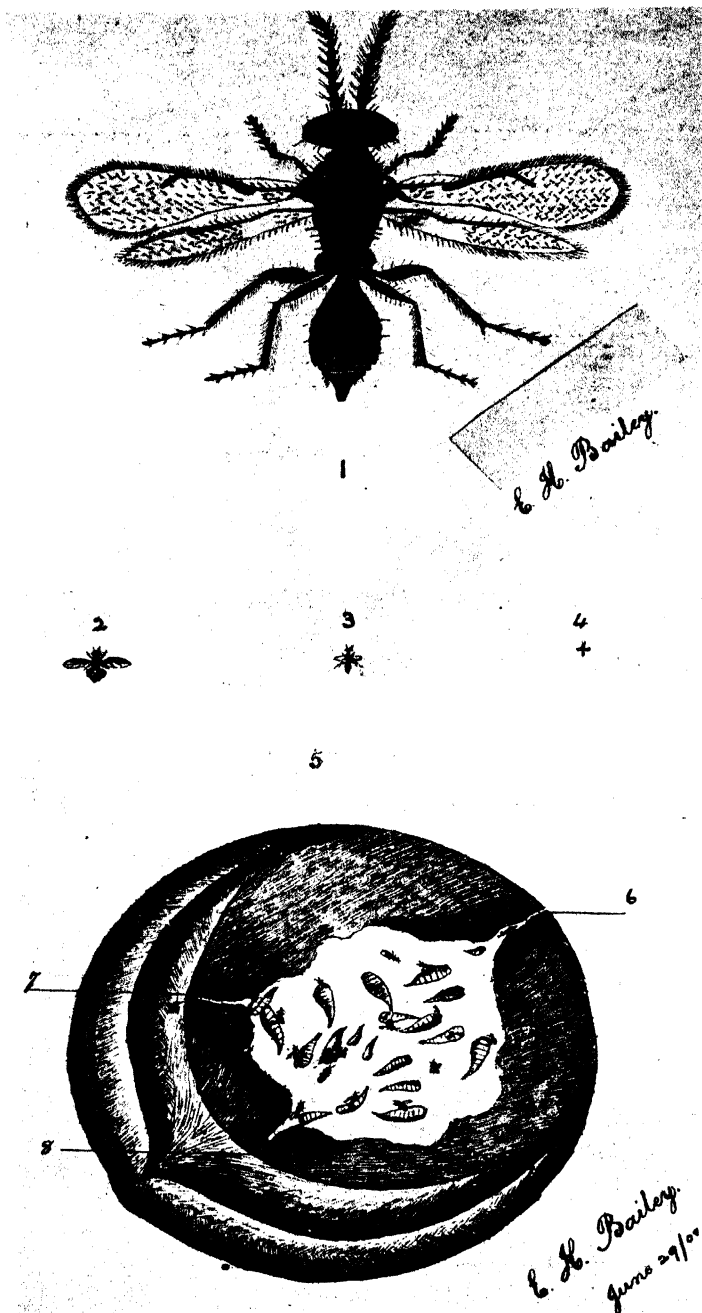
Small amounts of seed are best disinfected by soaking: (a.) Two hours in a solution of one-half pint formalin to 15 gallons of water, or (b) one and a-half hours in 2oz. of corrosive sublimate dissolved in 15 gallons of water.

For large quantities of seed, formaldehyde gas, generated by the use of potassium permanganate, is the most practical disinfecting agent. Place seed tubers in bushel crates or shallow, slat-work bins in a closed room. For each 1,000 cubic feet of space spread 23oz. of potassium permanganate evenly over the bottom of a large pan or pail in centre of room. Pour over this three pints of formalin, leave room at once, and allow it to remain tightly closed for 24 to 48 hours.

AGRICULTURAL OIL-MOTORS.

Within recent years several developments have been carried out in the use of mechanical energy for agricultural purposes, one of the most important of which has been the use of the automobile in various forms on the farm. The tendency has been toward the evolution of a small, powerful, comparatively light type of tractor, capable of superseding the horse and the general class of traction engine, but with a wider range of action, so that it can be used not only for the more difficult farming operations, such as ploughing, cultivating, and reaping, but when not so required can be utilised for ordinary haulage purposes at a comparatively high speed, and the driving of auxiliary agricultural machinery, such as threshing machines, chaff-cutters, and so forth.

A very efficient and handy oil motor of this type has recently been introduced in England. It possesses several novel features, and seems to have proved a highly successful all-round acquisition to the farm.—*N.Z. Farmers' Union Advocate*.



1. Female Parasite of Fruit Fly (enlarged 26 times). 2. Fruit Fly (*Ceratitis capitata*), natural size. 3. Female Parasite of Fruit Fly (twice enlarged). 4. Parasite (natural size). 5. Parasites at work on Fruit Fly larvae (parasites slightly enlarged). 6, 7, 8. Parasites entering tunnels made by Fruit Fly larvae.

THE FRUIT FLY PARASITE.

L. J. NEWMAN, Assistant Entomologist.

The problem of insect parasitism is a very fascinating one, full of great possibilities and has of later years become increasingly important to the economic entomologist.

The rapidity with which an injurious insect increases, when introduced into a new country without its natural parasite, is remarkable, showing how necessary it is to have the natural parasite to preserve the balance of Nature.

Take for instance the fruit-fly (*Ceratitis capitata*). Unfortunately this insect has been introduced into Western Australia and has increased so rapidly that it is to-day the most mischievous fruit pest we have. Up to date no parasite has been discovered in this State, attacking this pest.

There have been many thousands of maggots of this fly placed in breeding cases and in no instance has a single parasite issued, thus showing the reason for the sudden and phenomenal rate of reproduction, where the food supply is plentiful. Such conditions of rapid increase occur almost exclusively as the result of an introduction of an insect into a country where its natural parasites do not occur, and is at once classed as an injurious insect, whereas under natural conditions it was so held in check by its natural enemies as to prevent its abnormal increase, thereby keeping it below the danger line.

It is acting on this principle that Mr. Compere, the State Entomologist, has made his several trips around the world in search of the various parasites which prey upon orchard and garden destructive insects. On the black scale for instance, several species of internal parasites have been introduced, besides a number of predaceous ladybirds, which have proved beyond contradiction their power to control this pest. There are also other pests which could be mentioned in the same way.

There are vast numbers of parasitic insects, particularly *Hymenoptera*, which are to be found all over the world and closely allied the one to the other. The members of the order *Hymenoptera* have four wings, the hind wings being smaller than the front wings; the abdomen in the female is usually furnished with a sting, piercer, or saw. This order includes a large number of internal parasites, also such insects as bees, wasps, ants, and others.

One would naturally think that some of the allied species found in this State would attack the fruit-fly, but such is not the case, each species having its own particular host food, which if not present will fail to reproduce itself. There are exceptions to this rule, but as a general principle it is correct.

The parasite illustrated is a species of *Chalcid* wasp from India. At present it is unnamed, but specimens have been forwarded to Dr. L. O. Howard, Washington, for identification.

The *Chalcid* flies are among the smaller of the parasitic *Hymenoptera*, being usually minute insects. This particular species was among others, discovered in India by Mr. Compere and introduced into this State on the 7th December, 1907. The pupae containing the hibernating parasites were at once placed in breeding cases in the insectary. They had been on ice for 60 days, this being the only means of tiding over the period between the Indian

summer and ours. On the 15th of the month the first of the parasites issued and were at once placed on maggot-infested fruits. Within twenty hours of emerging from the pupæ they were hard at work depositing eggs into the larvæ of the fruit-fly, much to the latter's discomfort.

This species is the smallest fruit-fly parasite yet introduced, averaging about one-sixteenth of an inch in length, black, with strong metallic reflections, and gains entrance to the infested fruit through the tunnels made by the fruit-fly maggots and works principally on the fallen fruits. The difference between this species and the larger one described in *January Journal*, is that the larger one works from the outside of the fruit, locating the maggots and inserting the ovipositor through the skin, depositing only one egg in each maggot. Further they will not operate on decayed fallen fruit nor will they attack the naked maggot, whereas the species now under description attacks the maggots from any quarter, puncturing them with their ovipositors and depositing many eggs internally. The fruit-fly larvæ being capable of supporting a large number of the larvæ of this small parasite whilst only one of the larger parasites would find sufficient sustenance.

The eggs of the small species quickly hatch within the body of the host. The newly-hatched parasites do not feed upon the vital organs of their victim.

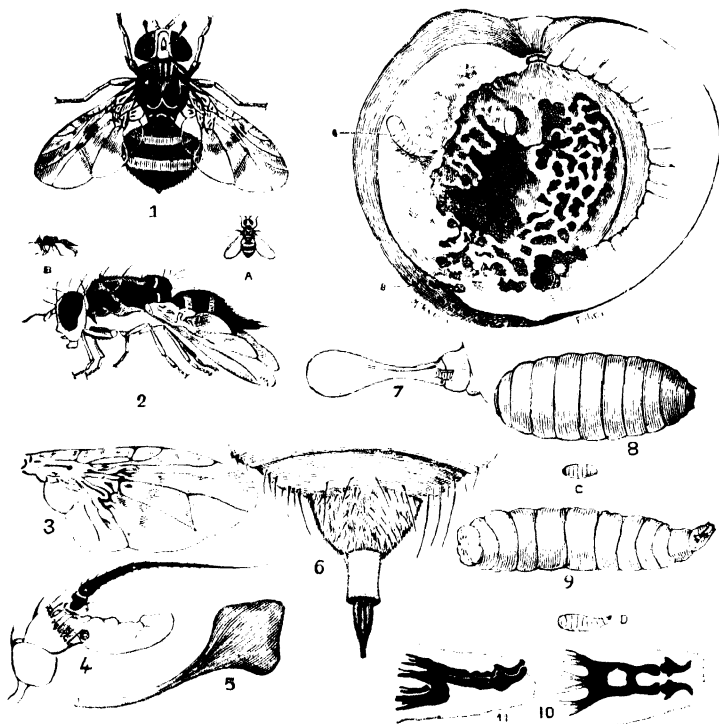
The fruit-fly larvæ so struck by the parasite, if not full-grown, continue to feed until mature, but when they pupate the parasite larvæ within, which up to this period has been feeding on non-vital parts, at once attacks the whole vital organs of the pupa, thus destroying what would, under ordinary conditions, have produced a fruit-fly. When the contents of the pupa have been consumed the parasites within pupate within the pupa shell.

The period occupied in the reproduction of the parasitic fly varies according to temperature, but under ordinary summer conditions is from twelve to fifteen days, from the time the fruit-fly larvæ pupates.

The reproductive powers of this little wasp are enormous, as many as twenty-five to thirty being taken from a single fruit-fly pupa, the average being about fifteen.

The life of this insect is very short, being at the longest four days, so that the work they do has to be done quickly. One can see the advantage the smaller species has over the larger, on account of its rapid reproduction and the fact that it works on the fallen fruit; the fallen fruit being the cause of all the trouble.

The method of reproduction is very simple. Rough breeding cases can be made by any handy man. Take several cases (according to quantity of maggot-infested fruit), about 9 inches to 1 foot deep, any length and width, covering same with the ordinary fly door netting, placing about 3 inches of earth in bottom. Good drainage is necessary, otherwise the soil in box becomes wet and sour from the decaying fruits. This can be done by boring a number of holes in bottom of case, covering same with a very fine mesh of wire and raising case slightly from ground on some material impervious to white ants. The cases should be located in the midst of infected areas and the fallen infested fruit gathered and placed therein. When the case is supplied with a good layer of maggoty fruit a colony of parasites should be obtained and applied. On no account should a heap of fruit be placed in one case, which will cause a flood, rapidly ferment and mould, killing both maggots and parasites. For every fresh case stocked with infested fruits a



FRUIT FLY (*Ceratitis Capitata*).

a, maggot; *b*, holes where maggots have escaped; Fig. 1, male fly; *A*, same (natural size), viewed from above; Fig. 2, female fly, viewed from side; *B*, same (natural size); Fig. 3, wing of fly; 4, antenna; 5, clubbed appendage from head of male; 6, terminal segments of female abdomen, showing ovipositor; 7, halter; 8, pupa, or chrysalis; *c*, same (natural size); 9, larva, or maggot; *d*, same (natural size); 10 and 11, hooked mandibles of larva. (After Fuller.)

colony of parasites should be obtained. When once established in a case the parasites will reproduce themselves, a percentage escaping through the mesh into the orchard. Any maggots which have escaped the parasites will develop into fruit-flies, which will not be able to get out on account of the fineness of the wire, they being so much larger than the parasites. On no account must the fallen fruit be burnt, as by so doing the parasitised maggots would in many instances be destroyed.

By working the cases systematically all the fallen infested fruit can be accommodated. Every eight to ten days the fruit can be cleaned out of the cases and burnt, the maggots by this time having left the fruit and pupated in the soil on bottom of box. A fresh supply of fallen infested fruits can be placed therein and so on with the other cases.

During the period from January to present date a succession of parasites have been kept going. There have been 150 colonies liberated, never less than 500 being liberated at one time. Also during this time two large colonies were forwarded to South Africa, which, from latest advices, are reported to be breeding out. It is yet too early to state with what success the liberation of these parasites will be attended; next summer will show.

With reference to artificial methods of combating fruit-fly, no successful remedies have yet been discovered. Many poison solutions have been placed on the market but have not proved successful, besides being so destructive to beneficial insects. The Department has made several experiments in this direction, but without any material success. The difficulty of treating this pest is the manner in which the female fruit-fly deposits her eggs, by puncturing the fruit and depositing them under the skin, thus placing the eggs out of reach of any solution. The young maggots on hatching bore their way to the centre. This characteristic often giving rise to the supposition that the eggs are laid in the flower, which is incorrect.

In conclusion, it behoves all orchardists and gardeners to assist the Department in this branch of entomology. They cost the orchardist nothing, being silent but free workers. This does not mean that an orchard or garden can be left to itself. The same amount of care and attention in keeping the trees strong and healthy, proper pruning, to let in light and air is necessary, as all parasites work better in light healthy conditions. To make a thorough success of parasites those interested must make a study of them—the methods of breeding and producing colonies. The releasing of colonies of parasites in different parts of an orchard or field has been found to increase the rate of parasitization. It has been proved that immediate results have been obtained by the release of parasites, and present investigations are bringing to light evidence that must cause important modifications of some of the accepted ideas as to the benefits or otherwise derived from the use of parasites.

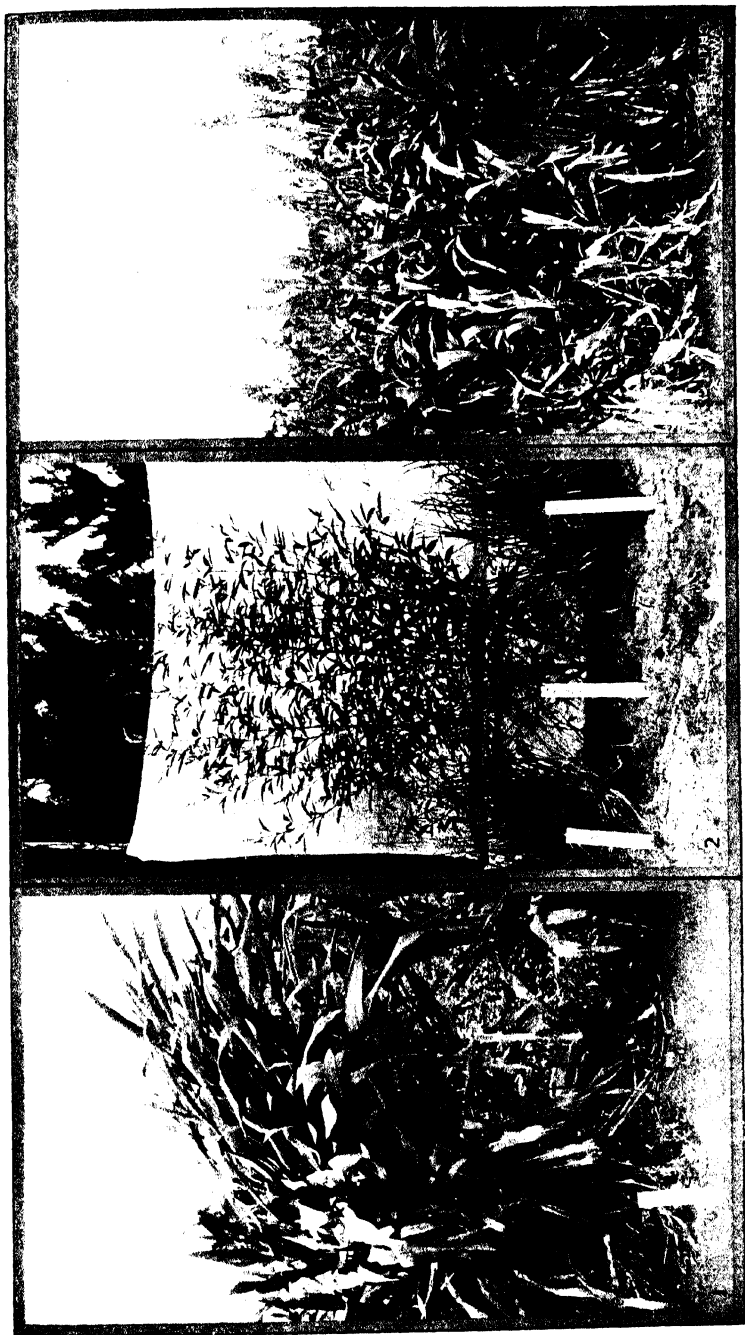
EFFECTS OF GRASS ON APPLE TREES.

The *Journal of the Board of Agriculture* (England) for May states that an experiment was commenced in 1902 at the Harper-Adams Agricultural College to compare the growth of trees when planted on grass or on cultivated ground. The grass upon which the trees are planted is manured regularly with farmyard and artificial manure, the grass mown and removed, while special artificial manures are used for each crop on the cultivated portion, in addition to farmyard manure, thus giving equal conditions as to manure for the trees on both plots. The difference between the trees on grass and those on cultivated ground has been very marked, as will be seen from the following table, showing the average diameter in inches of the trees at a distance of 4½ft. from the ground:—

Variety of Apple.	Average Diameter in Inches.					
	Grass.			Cultivated Ground.		
	1905.	1906.	1907.	1905.	1906.	1907.
Bismark	1·03	1·05	1·18	1·31	1·62	2·01
Bramley's Seedling	0·78	0·81	1·04	1·20	1·50	1·91
Cox's Orange Pippin	0·82	0·86	1·01	1·11	1·40	1·83

The wet season of 1907 benefited the trees on grass to a marked extent, for while in 1906 the proportionate increase was one in the trees on grass to 10 in the trees on cultivated ground, the increase in the past year was four in the trees on grass to 10 in the trees on cultivated ground. Insufficient moisture seems, therefore, to be one of the causes of the poor development of trees planted in grass.

At the commencement of 1907 the experiment was modified by removing from around the stems of alternate trees on grass a square of turf. The surface ground laid bare (4 square yards to each tree) was forked without disturbing the roots, and kept free from weeds throughout the year. The effect of this treatment was soon visible, the growth made during the summer was strong and healthy, and the increase in the thickness of the main stem was also marked. On the whole the growth was nearly equal to that made by the trees in cultivated ground, and very much greater than that made by the trees with grass all around the stem.



Gr. 140.

1. Teosinte, *Echinochloa polystachya* (L.) Gaertn. (non-stachyrid); 2. rice, *Oryza sativa* (L.) Gaertn. (non-stachyrid); 3. Kaffir (non-stachyrid) Corn, *Oryza sativa* (L.) Gaertn. (non-stachyrid).

Handel Experimental Station.

RECIPES.

Ailments in Sheep.—When the corners of the mouth or nose of sheep are drawn up, giving an appearance of great misery, that sheep is in a bad way, and should be taken without delay and duly cared for. Generally a dose of salts or oil, with tonic mixture after it, will right the trouble.

Treatment for Glanders.—A Belgian veterinary surgeon reports that he has cured confirmed glanders by giving at first five and then three granules of the sulphate of arseniate of strychnine every two hours for ten days, the dose then being reduced to two granules. A solution of sulphate of zinc was injected into the nostrils, and the farey balls stuterised. There had been no return of the disease for a year at the time the report was made.—*Live Stock Journal.*

Worms in Poultry.—Thymol is recommended. Dose: 1 grain made up in a dough pill and administered day and night. Two grains of santonine can be given in the same way with good results.

Leather-chewing.—When cattle chew leather, wood, or old bones, it indicates a lack of phosphate of lime in their food, which is required to supply bone material. A teaspoonful of bone meal given daily with their grain will correct the habit and supply the deficiency which induces it.

Cow Scouring.—Try maize meal and wheat flour with a little bean meal, and give daily two drachms of powdered sulphate of iron with six drachms of powdered catechu. If it is only a functional disorder this should soon have effect, but if due to intestinal tuberculosis nothing will stop it.

Pigs with Worms.—Give one grain of calomel, two grains of santonine, and ten grains of jalap in a handful of meal after fourteen hours fasting.

SPREADING MANURE.

"The results from manure depend in a large measure on how it is spread," writes an American farmer in *S.F. Chronicle*. "I have often seen it thrown out in chunks as large as a man's hand. There is no profit in this kind of work. The best results are obtained by spreading very evenly, and not too heavily, and breaking it up into very fine particles. This is why the manure-spreader gives better results than hand spreading. It is distributed more evenly, and broken up into finer particles than it is possible to do by hand. The spreader is a

paying instrument where any considerable amount is to be spread. One load will cover almost twice the area, and produce as much grain per acre as it would if spread on half the ground by the old method. In spreading by hand it pays to break it up as finely as possible and use extra care in spreading it evenly over the ground. After it has been spread take the large steel smoothing harrow and go over it two or three times. This breaks the manure up into finer particles and distributes it over the ground better, making it immediately available as plant food.

No farmer who does not save his manure carefully has any idea how much he is losing. To determine the extent of his loss he must try handling it in an up-to-date manner. I know from experience that it means a loss of many pounds if the manure is neglected. I have in times past done as many farmers are doing yet, let it care for itself until it accumulated in my way and I was compelled to remove it. But since abandoning this wasteful method and managing as stated above, I am actually making three loads where I got only one under the old way."

CERTIFIED MILK DAIRIES.

In the United States milk commissions have been organised, with physicians to supervise the production of milk and ensure its purity by certificate over their names.

The objects are to establish correct clinical standards of purity for cow's milk; to become responsible for a periodical inspection of the dairies under its patronage; provide for chemical and bacteriological examinations of the product, and the frequent scrutiny of the stock by competent veterinarians; to promote only professional and public interests.

The following are three general requirements or standards for the milk: (1.) An absence of large numbers of micro-organisms, and the entire freedom of the milk from pathogenic varieties; (2), unvarying resistance to early fermentative changes in the milk, so that it may be kept under ordinary conditions without extraordinary care; (3), a constant nutritive value of known chemical composition, and a uniform relation between the percentage of fats, proteids, and carbohydrates.

It is the general practice in certified dairies to remove the manure at least twice daily to the field, or to a suitable pit some distance from the stable. In the most carefully managed dairies the whole interior of the stable is washed and scrubbed daily with water containing a washing compound. Some use a disinfectant in the water once or twice a week, as bichloride of mercury, carbolic acid, or permanganate of potash. Bichloride of mercury is probably the most expensive of any of the disinfectants; aside from this

fact it is one of the most satisfactory because it gives off no odour. One dairyman uses cresol in water daily. Where the interior of the stable is built of wood, it is whitewashed from two to twelve times annually, or kept well painted. Laud plaster is the most common disinfectant for floors and gutters. Slacked lime is also satisfactory for this purpose. Shavings are most in favour for bedding. Some dairymen do not use any bedding, but this system is not recommended.

The cows are cleaned daily with currycomb and brush. The udder and parts in proximity to it are either washed and wiped with a clean towel, or are wiped with a damp cloth or sponge. In many cases the udder, flanks, etc., are clipped periodically. Occasionally a dairyman sprays stables and cows immediately before milking. It is a common practice to fasten up the cows after they have been cleaned, in such a way that they cannot lie down till they have been milked.

In a few dairies where extraordinary care is used, the whole body of the cow is groomed an hour or more before each milking, and any soiled parts are scrubbed with a brush and water containing a washing compound; the entire body is bathed from the neck back; the tail is washed; the udder is washed in sterile water from a sterile pail, and dried with a clean towel, a separate one being provided for each cow.

Milkers and Milking.

In a few dairies the milking is not done in the regular stable, the cows being taken to a milking room entirely separated from the rest of the barn. This room is well lighted, and every precaution is taken to make it absolutely sanitary. Other dairymen claim that just as good results can be secured by milking in the regular stable if proper precautions are taken. As some of the lowest bacteria counts on record have been obtained where the latter plan is followed, this fact would seem to substantiate the claim.

The custom is almost universal for the milkers to be clad in freshly laundered suits. Where the most extreme care is taken, the clothing of each milker receives a thorough cleansing with boiling water after every milking, and is then locked in an individual air-tight drying room, where it is sterilised and dried by steam, remaining there until wanted for use. Before putting on their special suits, milkers are required to wash their hands and faces and clean their nails. At least one producer requires that before the milker commences his work he shall take a shower bath, provision for which is made in rooms adjoining the laundry. When ready for milking the milker is supplied with a pail and a stool, both of which have been cleansed and sterilised since last in use. With these extreme precautions, when the milker goes to the milk room, he is as clean in person and equipment as it is possible to make him. In milking it is a common practice to discard the foremilk. The milking is done strictly with dry hands, except in a few instances where vaseline is employed (a usage which is reported to be entirely practical). In some dairies milkers are required to wash their hands before milking each cow, but this is not the general practice.

PIGS: HOW TO BREED AND FEED THEM.

The Victorian breeders are adopting the Canadian methods of rearing and feeding pigs. A Victorian exchange publishes some valuable information on the subject given by Mr. William Smith, the Government expert, in a lecture delivered by him at a meeting of the Smeaton Agricultural Society, from which we take the following extracts:—

"Cows and sheep are simply 'not in it' in comparison with the pig, according to the dictum of Mr. William Smith, the Government pig expert, who has had a life-long experience of what swine will do for those who keep them and treat them properly. The pig is recognised as the 'scavenger' about the place, disposing of what would otherwise go to waste, but Mr. Smith contends with all the force lent by practical knowledge that this commonly despised animal is the 'gentleman' who will do more than pay the rent or feed the family. In a soundly practical way he asks the landowner who depends largely on the produce of a dairy herd—feeding the skim milk to a pig or two—to consider and compare the return from a good 'Berky' sow crossed with a 'Yorky' hog, with the best that can be obtained yearly from a cow. Mr. Smith does not, of course, advocate the discontinuance of dairying operations, but only endeavours by comparison to demonstrate the importance of the animal to which (with his hat off) he refers in terms of the highest commendation.

How to Breed.

"Years ago the Berkshire was the ideal pig, and no doubt he was so still, but by inbreeding the Berkshire had been deteriorated. Some people had gone in for breeding the Tamworth pig—a 'pretty' animal, was he not! They could not breed a pretty thing from two ugly things, but from two pretty things they might expect to get something pretty. Let them take such of the best of the Berkshire sows as they had at the present time, with 12 or 14 teats, and secure the best Yorkshire hog that they could possibly get. In this way they should have pigs which at 5 months old would weigh 140lb., and this would be found to be good business, as that was the class of pig sought after by those in the curing trade. If they got the breed to which he referred—the cross between 'Berkys' and 'Yorkys'—they would not eat half as much food as poorly-bred pigs, and the results would be infinitely better. As soon as that kind of pig came into the market there was a rush to get them, while the indifferent sorts were passed by.

How to feed.

"Peas (fed dry) and good crushed barley (soaked) were excellent feed. Whatever they did, he wanted to again impress them to get good breeding to start with, and then the feed would tell. At five months old the young pigs ought to be worth £2 10s. each, and a sow should have five litters in two



Geo. Hill.

Hamel Experimental Station.

1. (a) *Panicum bulbosum*; (b) *Panicum prolatum*; (c) *Panicum decompositum*.
2. Field of African Wonder Grass (*Panicum spectabile*).

years. At present there was a scarcity of grass owing to the lack of rain; but if they had a pig and kept him warm he would do all right. An increase of 20 pigs in a year from one sow was what might be obtained on the average, and with 10 sows and a good hog on 40 acres of land a man must do well. People were buying pollard at 1s. 6d. per bushel when barley meal or pea meal was just as good. In dealing with a pig they must feed him and keep him going ahead. Never (the lecturer urged) let the pig get hungry and have to call for its food! Feed them (he continued) and fatten them and then get quit of them! There was no labour in keeping pigs in comparison with the work required with a dairy cow. They could throw peas to the pigs in the straw, and the pigs would thresh them. When the young pigs were able to run—at three weeks old—the hogs should be ‘treated.’ At six weeks old they would be able to look after themselves. It was a mistake to think that young pigs could be neglected, or carelessly treated, while they were ‘growing.’ Keep them well and give them as much as they could eat, and in five months they would get a 140lb. pig. ‘Half-fat’ pigs were no good to the curer, and it simply meant that those who sold pigs ‘half-fat’ lost £1 on each pig. When a pig was full grown—and intended for the market—it should be sold. If pigs were fed on separated milk it should never be given to them in a fresh state. They should put a handful of meal in the milk and leave it for 24 hours to ferment. The fermentation had to take place, but it was better for it to occur ‘outside the pig rather than inside.’ Nothing would scour a pig more quickly than fresh separated milk. A joke was often played on a new boy at a creamery by giving him a drink of separated milk. They knew the effect on the boy, and it was the same on the pig. Don’t give the pigs pollard. Give them barley meal—a substantial food. If they boiled potatoes for the pigs, don’t use the water that the potatoes were boiled in. Throw that water away. If they washed their hands in such water they would be able to form an idea of the effect it had on the pig’s stomach and intestines, from which it removed the natural coating—a very serious thing. They should soak the meal in fresh water, and then they would have good food; and fresh water should be used for mixing meal with the potatoes if they wanted to mix anything with the potatoes after they had been boiled.

How to make a Sty.

“Sties should not be too elaborate, as if anything ‘went wrong’ with the pigs and the sty had to be taken down or removed to another site it would be a simple thing to either take down or remove an inexpensive structure. In the sties where the young pigs are to be littered there should be placed a board (of about a foot high) around three sides of the sty, at 10 or 12 inches from the wall. The mother would then lie down inside the enclosure thus formed within the sty, and if she happened to be close to the board the young pigs could walk round the outside space and get to the teats. Build the sty with the front toward the east, to get the benefit of the morning sun. They would never have any swine fever if they looked after their pigs and kept them warm. To do what he had suggested would not cost much. They should not put the sty in a low place. A pig was not a dirty animal—he was the cleanest animal about the place. If they would carry out his recommendations they would find there was more in pigs than in sheep, lambs, or

cattle. A good sow was better than their £60 draught horses. It took four years to get a draught horse up to £60, but if they only got £1 apiece for 20 pigs a year they would realise the £60 in three years; and if they put £1 worth of feed into their pigs (valued at £1 each) the pigs would be worth £3 apiece. The pig was really more valuable than anything else on the farm. In the language of a statement that they might have read somewhere he could say, 'Where the pigs are there will be buyers also.' One firm paid the Railway Department £1,500 a year for trucks. The coming article to-day was pork; and bacon would always be a good price. It was a mistake to sell a pig at 70lb., which some people did 'because the little pig was fat,' as it only took half the time and half the feed to increase the 70lb. to 140lb. He hoped that the people in this part of the State would go extensively into the pig-raising business, as the Government was anxious to see the export trade increasing."

Many questions were put to Mr. Smith at the conclusion of his lecture, his replies being summarised as under:—

White pigs are more valuable than black ones, more ideal and better cross. Feed young pigs until they are ready to sell at 140lb.

A pig very bad with "staggers" is not worth treating. It is beneficial to give a tablespoonful of salt in the pig's food once a week; much salt is injurious. Never give pigs any fat. It is not necessary to cut the pig's tail to bleed it; bleeding can be done by cutting the veins.

Pigs cannot fatten on melons; but melons and swede turnips are good for sows and young pigs. Sows with litter should be well fed, including grain food.

Mr. Smith objects to boiling food for pigs, or giving them water potatoes have been boiled in. Crushed grain and soaked should be given. Fresh drinking water is an essential. Pea-feeding is recommended for producing weight.

Bacon from slaughter-house pigs was compared to dirty tallow. Maize-fed pigs produced the sweetest pork when eaten fresh.

Peas should be fed dry, the pig can crush them. Pea-meal can be given to young pigs. Fattening pigs should be allowed a little room to move about, not too much.

Mr. Smith favoured the pure-bred Yorkshire; there was no relationship to the Berkshire sow; and his advice was to use the white hog. The Tamworth pig was too big boned and too coarse to get hams out of them.

STANDARD CORNSACKS.

The action of the Federal Government in reducing the standard size of wheat sacks to 200lbs. weight met with general opposition in this State, and protests against the alteration were made by the Farmers' Associations in several districts; and objection was also raised by Chambers of Commerce. The chief points of dissent were: that the Federal authorities were infringing State rights; undue interference with farming interests; increase of the cost

per ton of bag produce; alteration of bagging machines to meet the new requirement, entailing serious expense on the farming industry.

The Minister for Agriculture opposed the alteration on the grounds of increased cost to the grower, and that it would be no easier for lumpers to handle a 200lb. bag than the one in use. Mr. Mitchell contended that any alteration to be of benefit to those handling the grain without lifters would need to be to the extent of about two bushels or 120lbs. in weight.

Urged by the many representations made to him in these directions, the Premier addressed a communication to the Commonwealth Prime Minister on 30th March, submitting the many objections for the further consideration of the Federal Government. To this Mr. Deakin replied on 15th April that the subject had received careful consideration before the issue of the Proclamation bringing the new standard into operation.

The Prime Minister further stated that "reliable quotations obtained from leading merchants in the bag trade show that the smaller bag prescribed by the Proclamation will be purchasable at 1s. 0³/₄d. per dozen less than the old standard sack, so that the cost to the farmer will not be increased. A considerable amount of evidence has been obtained to show that there will be but little difficulty in adjusting present farming arrangements to suit the handling of the new bags, and it is plain that the reduction of weight must facilitate all the operations." Mr. Deakin concluded by saying that the balance of advantage was so overwhelmingly in favour of the reduced weight that the withdrawal of the standard prescribed could not be contemplated.

The Prime Minister drew the Premier's attention to the terms of a by-law of the New Zealand Government Railways to the effect "that on and after 23rd January, 1909, the maximum weight of any sack of wheat, barley, or oats to be carried by railway in the Dominion shall be 200lbs., and that any sack of such grain containing a greater weight than 200lbs. shall be charged four times the ordinary rate of freight."

BREEDING FROM EWE LAMBS.

The practice of breeding from ewe lambs is said to be spreading in England, and is meeting with approval among practical men. The main reason for adopting this system is that it pays by saving one year's keep. Professor John Wrightson points out, however, that there are some disadvantages that cannot be denied. In the first place, a two-toothed ewe that has already nursed a lamb is considerably smaller than one that has only yielded a fleece, and in the outcome the difference in value has been as much as 10s. to 15s. per head, or 45s. to 50s., against 60s. Secondly, it can scarcely be doubted that ewes which have produced lambs as tegs cannot last so long as ewes which produce their first lambs at two years old. The argument against this growing practice is based upon general considerations, applicable to all animals—namely, that too early breeding undermines the constitution. A third objection is that the system frustrates itself, and cannot be brought into line with one regular lambing-time, from which the ages of

sheep can be reckoned. This is shown to be the case by the following consideration. If ewe lambs are to be put to the ram in their first autumn, they must be dropped early, and even then their lambing will be later than that of older ewes, and must alone check continuous breeding from lambs. It means either that a fresh lot of lambs must be bought every year, selected for their size and good condition, or that there must be two lambing times, one for the older ewes and one for the ewe tugs. Professor Wrightson, therefore, concludes that while breeding from ewe lambs necessitates a well-grown lamb and early lambing, late lambing and small size are the inevitable consequences. As long as the advocates of this system replenish with big, early dropped lambs, well and good; but they certainly do not themselves contribute to this object. It therefore appears to him that if the object is immediate profit, the system may answer, as long as it does not become general; and that the profit depends upon, so to speak, stealing a march upon the slower and safer breeders, who must, however, still remain as the backbone of the system.

Professor Wrightson next discusses the question as to whether it is intrinsically advisable to breed from ewe lambs. This involves questions of age, size, and keep. It is possible that by early lambing and liberal feeding from birth ewe lambs may be able to produce lambs at fifteen months old without injury, and then be passed into the flock. One well-known ram breeder, the late Mr. De Morgan, followed this plan for years, and maintained a fine flock until its dispersion. The more usual plan is to keep ewe lambs in store condition, and to bring them into the flock as mothers at two years old. The use of ram lambs cannot be urged as an argument in favour of breeding from ewe lambs. The cases are different, as a ram may be used more or less, and if he is overworked he will suffer as a shearling. It is certain that shearlings which have been used as lambs never command the same price as those which have been reserved until one and a-half year old. Ewe lambs cannot escape the consequences of breeding, as they have to bear and suckle their lambs, and to stand the full strain of maternity. In New Zealand ewe lambs are occasionally bred from, but it is by no means a general practice, and under present conditions of sheep raising is not likely to be adopted. But if considered, the points raised by Professor Wrightson should not be overlooked.—“Korari,” *Christchurch Weekly Press*.

FLIES ON CATTLE.

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(*Pacific Dairy Review*.)

When flies become thick the milk flow rapidly goes downward. The thoughtful dairymen try to avoid this condition, and use one of the different preparations on the market for this purpose. A good spray that can be made up at home is as follows: Fish oil, 100 parts; oil of tar, 50 parts; crude carbolic acid, 1 part.

This formula, devised by Dr. E. L. Moore, of the South Dakota Experimental Station, has been found to be quite effective. It is sprayed on to the animals by means of a small hand spray pump, one application being suffi-

cient for two days. The longer between sprayings the more thoroughly the animals must be gone over. The odour of the preparation does not taint the milk, according to the above veterinarian, but the milk must be removed from the barn at once after milking, which should be done whether a spray is used or not.

Every dairyman knows, as a result of his own observation and experience, generally at no small expense to his bank account, that flies mean much loss to the production of his herd. If it is impracticable or undesirable to keep the cattle in a dark stable during the day, the dairyman should use either the preparation given above or should purchase a ready made one. In either case, whatever the cost of the preparation may be, it will be more than regained in the increased amount of milk the cows will give.

No doubt this solution applied to horses would afford them the same protection from one of Australia's greatest summer pests.

GOVERNMENT LABOUR BUREAU.

The following report of the operations of the Government Labour Bureau for the month of June has been submitted by Mr. J. Longmore, Superintendent of the Bureau:—

Perth.

Registrations.—The total number of men who called during the month in search of work was 666. Of this number 300 were new registrations and 366 renewals, *i.e.*, men who called who had been registered during the year prior to the month of June. The trades or occupations of the 666 applicants were as follows:—Labourers 216, farm hands 61, handy lads 59, handy men 51, cooks 44, carpenters 21, gardeners 20, bushmen 17, miners 17, drivers 11, painters 11, blacksmiths, clerks, and hotel hands 9 of each, bakers 8, grooms 7, caretakers 6, engine-drivers 5, kitchenmen 5, butchers, farm lads, and station hands 4 of each, boilermakers, strikers, and yardmen 3 of each, and 59 miscellaneous.

Engagements.—The engagements for the month totalled 197. The classification of work found was as follows:—Bushmen 40, labourers 33, handy men 18, farm hands 17, handy boys 14, farm lads 9, cooks 8, dairymen 8, sawmill hands 7, carpenters 6, firemen 4, fencers 3, gardeners 3, and 27 miscellaneous.

Kalgoorlie.

Registrations.—There were 35 new registrations for the month, and 28 renewals, total 63. The classification was as follows:—Labourers 19, canvassers 17, handy men 13, handy youths 6, blacksmiths, carters, engine-drivers fitters, firemen, gardeners, paperhangers, and strikers 1 of each.

Engagements.—The engagements were 17, classified as follows:—Canvassers 14, labourers 2, and 1 engine-driver.

The female servants who called numbered 18. There were 9 new registrations and 9 renewals. The classification was as follows:—Waitresses 5, generals 3, housemaids 3, cooks 2, housekeepers 2, laundresses 2, and light generals 1. There were no engagements.

Northam.

Registrations.—The applicants for work numbered 23, classified as follows:—Farm hands 9, clearers 6, handy men 3, labourers 3, and axemen 2.

Engagements.—There were 12 engagements, viz., farm hands 6, clearers 4, axemen and labourers 1 of each.

Women's Branch, Perth.

Registrations.—There were in connection with this branch 101 registrations and 86 renewals, total 187. The classification was as follows:—Housemaids 42, laundress-charwomen 30, cooks 29, generals 26, light generals 19, housekeepers 11, waitresses 10, useful girls 5, nurses 4, pantrymaids 3, and 8 miscellaneous.

Engagements.—The engagements numbered 74, classified as follows:—Laundress-charwomen 30, generals 22, housemaids 9, light generals 5, housekeepers 2, cook-laundresses 2, and 4 miscellaneous.

General Remarks.

At the central office, Perth, 666 men called during June. This total is 114 short of that for May, and 63 in excess for June last year. The engagements were 197, which is 95 short of the number for May, and 25 more than for June, 1907.

GARDEN NOTES FOR AUGUST.

By G. CHITTY BAKER.

In the ordinary course of seasons August may be considered as the first month of early spring, and, providing that the winter has not been too wet, an early start can be made in most garden operations—sowing seed or preparing ground for larger sowings next month. It should always be remembered that it is the early vegetables that obtain the best price. Still, on the other hand, if the weather continues wet and cold, there is no advantage in sowing too early, as the growth becomes stunted, while seed sown a week or two later will come on quicker, and in the end mature earlier, with better results.

Only on ground that is well drained and deeply cultivated should any attempt be made to sow seed on a large scale. One of the most important operations to undertake as early as possible is the forming of cold frames for the purpose of raising young plants of tomatoes, melons, and cucumbers.

Cold Frames.

The best way of making cold frames, because it is simple, quick, and cheap, is as follows:—Obtain a load of 6 x 1 jarrah, cut it up into lengths of 6ft. and 4ft. The 6-foot lengths are for the front and back, while the 4-foot lengths are for the sides. Use two boards for the back, and one for the front; three 4-foot lengths are required for sides, one cut diagonally, so that one and a-half boards will be used for each side. Nail together with 2in. wire nails. This will make the body of the frame. For the top use 2 x 1 Oregon; four pieces will be required, two 6ft. 2in. long and two pieces 4ft. 2in. long; these can be either mortised and tenoned or simply half together.

On this tack a piece of hessian or scrim; this, if properly made, will lie on the frame nice and snug, at the same time projecting one inch over all round.

Having made the frame, the next thing is to obtain a few loads of good manure, a load will be required for each frame. Spread on top of the ground in a space seven feet by five feet, which will give a projection of six inches all round. Beat this down firmly, and then spread about three inches of nice sandy loam on top. Place your frame on top, when it is then ready to sow the seed. The top should be lifted off on fine days for a few hours, until the young seedlings commence to show up; it must then be taken off every morning early, or the plants will be drawn up and become too weak.

In three weeks time they should be potted and placed back in the frame again, using a little charcoal for drainage, which keeps the soil nice and sweet. A fortnight or three weeks later they should be ready to plant out.

By this means tomatoes, melons, and cucumbers may be obtained at least a month earlier than they would be if the seed were sown in the open ground.

Care must be taken, however, that the manure used is not too fresh, for if so it is liable to fire; well rotted manure that has been turned two or three times is the best.

All spare ground should receive a good dressing of well rotted stable manure for the purpose of digging in at the first opportunity. A hundred loads per acre is none too much, as this only means 24lbs. to the square yard, or two small shovelfuls. Not only does it supply plenty of plant food in the best possible form, but it also assists in conserving the moisture against the dry weather, as well as helping to bind sandy soils and loosen stiff and clayey soils.

Ground so prepared will suit cabbage, lettuce, potatoes, peas, beans, and onions, and will then be found in good heart for root crops to follow, such as carrots, turnips, parsnips, and radishes, as none of these should be grown in freshly manured ground.

Artichoke (Globe).—If not already planted, beds should be made up at once and suckers planted out, two feet apart in rows four feet apart. If seed is sown the plants do not come into bearing until the year following.

Artichoke (Jerusalem).—The tubers of these must be planted this month. A plot of ground should be set aside for this, as once cultivated it is difficult to clean the ground of all tubers, consequently each year a lot of self-sown plants come up; whereas if the one plot is well manured each year it will last for three to five years.

Asparagus.—This plant is not cultivated to the extent it deserves, considering how easy it is to grow, and the ready sale always waiting for it. It is surprising that we do not see more of it in our gardens. Asparagus is best raised from plants, which may be obtained from one to three years old. If seed is used then a season at least is lost. The seed bed should be worked into a fine tilth, and when the "grass" from the seed is about six inches high it should be thinned out so that the plants stand about 12 or 18 inches apart. For full particulars of cultivation, preparing the bed, etc., see Bulletin No. 27, on Vegetable Growing, to be had free on application to the Department of Agriculture.

Beans (French).—In districts where all fear of frosts has passed, a good sowing of these may be made: one of the best is "Canadian Wonder." In other districts only small sowings should be risked.

Beet.—All varieties of this may be sown largely—globe or turnip, long, and silver. The last named is grown for its leaves only, which are a good substitute for spinach, while the mid-rib may be cooked separately and served up on toast with a little white sauce, when it will be found to be very tasty.

Cabbage.—Seed may still be sown, selecting the later varieties; while young seedlings should be planted out as soon as big enough.

Capsicums and Chilies.—Seed of these may be sown in cool frames.

Carrots.—A large sowing can be made of this and continued every fortnight for succession.

Celery.—Seed beds should be ready for raising young plants as quickly as possible for planting out next month.

Cucumber.—Sow early sorts in cool frame.

Leek.—A large sowing of this may now be made. It will be found best to sow in drills in well manured ground, in rows two feet apart, thinning out the young plants to remain about 9 inches or a foot apart in the rows.

Lettuce.—Sow for transplanting. This is the last month that it is safe to sow in seed beds for transplanting.

Melons (Rock and Water).—A few may be reared in cool frames. In moving these great care must be taken not to injure the main roots.

Onions.—A large sowing of these should be made this month. They will come in very acceptable as spring or bunch onions.

Peas.—Sow largely of main crop and late varieties. Stick those growing; if allowed to lie on the ground the crop suffers considerably both in quality and quantity. It always pays to stake all varieties that grow over 18 inches high.

Pumpkins.—A few hills of these may be sown. Put in about a dozen seed and afterwards thin out to three or four.

Parsnips.—A large sowing of these may be made. Keep growing crops free from weeds, and ground well cultivated.

Turnips.—Both the ordinary and garden swede may be sown every fortnight for succession.

Tomato.—Sow in cool frame.

Vegetable Marrows.—Sow a few seed of early varieties in hills six feet apart all ways, three to four plants being allowed to remain in each hill.

Herbs.—No garden is complete without its herb bed. Plants may be obtained from the seedsmen, or seed of most kinds may be sown in boxes and planted out later on. It is recommended, however, that young plants should be obtained when possible. A bed about 20 ft. by 10 ft. will be ample for an ordinary family; the border should be sown with parsley, which sets it off and makes it look very pleasing to the eye.

MARKET REPORTS.

WESTERN AUSTRALIAN APPLES IN GERMANY.

It will be remembered by those interested in the apple export trade that the R.M.S. "Asturias" took from Fremantle a record shipment of about 500 cases of Western Australian apples for sale, on account of the growers, on the European markets. A portion of the shipment was sold in London, and, in common with nearly all the shipments from Australia to London this

year, realised disappointing prices, the result largely of the heavy carry-over from last season of American and Canadian "cold stored" apples. The bulk of the shipment by the "Asturias" was, however, forwarded from London for sale in Germany, and by last mail Messrs. H. G. Barker & Co., who organised the entire shipment, received full particulars of the sale, which took place at Hamburg on May 14. In all, 5,629 cases from the various Australian apple-growing States, and *ex* the steamers "Westfalen," "Gee-long," "Sarpedon," "Bremen," and "Asturias," were offered for sale on the one day. The Western Australian apples were alone particularised on the catalogue, all the others being simply described as Australian apples. This was due to the great reputation which previous shipments of Western Australian apples during the last three years have won on the German market. Competition for the Western Australian fruit was keen, and the bidding spirited, the result being that the highest prices obtained at the sale were those realised for Western Australian apples. To particularise, consignments of Jonathans from the orchards of Dr. J. W. Hackett, Donnybrook, and Mr. R. Egerton Warburton, Bridgetown, realised 16s. 3d. per case, and of Cleopatras and Dunn's Seedlings, from the orchards of Mr. E. C. D. Keall, Bridgetown, and Mr. E. Egerton Warburton, Mount Barker, from 15s. 6d. and 16s. 3d. for Cleopatras to 16s. 9d. for Dunn's Seedlings. The prices mentioned were considerably higher than the best obtained for apples from the Eastern States, among which a small consignment of picked Jonathans realised 15s. per case, of Cleopatras 15s. 3d. per case, and of Dunn's Seedlings 15s. 9d. per case. The great bulk of the apples from the Eastern States, however, sold at from 7s. to 11s. per case, whereas the average price obtained for the Western Australian apples was over 13s. per case. Among Western Australian shippers other than those mentioned above who obtained what must this season be considered good prices were Mr. J. A. Roberts, of Mount Barker, whose Dunn's Seedlings realised 14s. 3d. per case; Mr. W. Scott, of Mount Barker, whose Cleopatras realised 13s. 3d. per case; Messrs. H. J. and F. Simper, Fremantle, whose Cleopatras realised 12s. 6d. per case; Mr. J. R. Walter, of Bridgetown, whose Jonathans realised 12s. 3d. per case; and Mr. T. Walters, of Preston, whose Jonathans realised 12s. per case.

PRODUCE MARKETS.

Under date of June 5 Messrs. W. Weddel & Co., London, report as follows:—

Wool.—The third series of public colonial wool sales, which was proceeding at the date of our last report, was brought to a close on the 29th ultimo. The following quantities were catalogued:—

Australian	..	..	..	62,748 bales
New Zealand	85,909 bales
South African	5,997 bales
South American	17,491 bales
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Total	172,145 bales
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of which it is calculated 61,000 bales were taken by the Continent, 95,000 by the Home trade, and some 6,000 bales went to America.

The selection of merinos was not a good one, and consisted largely of speculation lots—a heavy test for any market. However, the last week of

the sales showed a decided improvement, and good and medium wools in the grease sold about on a par with March rates; while faulty sorts, both in scoured and grease, met a much more regular market than formerly, and sold well right along at more money than in March. For good scoureds there was a rather disappointing demand, chiefly on account of the limited enquiry from the Continent.

Arrivals for the fourth series of sales, which commence here on 14th July, amount to 86,000 bales, of which 25,000 bales are from New Zealand, 55,000 from Australia, and the balance from South Africa.

Grain.—Wheat, etc.—A dull and depressed market has been experienced during the fortnight, and business reported is very limited, although sellers are prepared to accept a decline of 3d. to 6d. per quarter. A large number of cargoes of wheat are arriving off-coast, and there are many more now due, and this, together with a continuance of fine weather, is too much for buyers, who are, for the present, content to "look on."

The appearance of the growing wheat has improved very considerably during the past fortnight, both in the U.K. and on the Continent, and the prospects are more favourable, owing to a spell of brilliant weather.

English Wheat.—Fair supplies are offered on the various exchanges, and late rates are well maintained—34s. 6d. to 35s. per 504 lbs. being paid for good reds. The average price last week of 33s. 5d. per imperial qr. marks an advance of 4d. per qr. from the previous fortnight, and is 2s. 1d. per qr. dearer than at the same time last year.

Australian Wheat.—Ex Store.—There is still a fair enquiry for this, and values are unchanged at 39s. to 40s. per 496 lbs.

New Zealand Wheat.—Ex Store.—We quote nominally:—36s. to 37s. for Shortberry, and 37s. to 38s. for Longberry, per 496 lbs.

Frozen Meats.—General Market.—The demand for lambs has been good, but trade in beef and mutton has been again slow. Home-grown mutton is in small supply, and on that account prices are rather better at 7d. @ 7¾d. for Scotch and 6¼d. @ 7¼d. for English. Arrivals of chilled beef have been heavier, and quotations have given way. States sides have also been more plentiful, and are lower at 5½d. @ 6¼d. State cattle at Deptford are unchanged in value at £18 10s. @ £23 10s.

In the frozen meat markets prices for beef and mutton are lower, but lambs with increased consumption and only moderate supplies are firmer.

Mutton.—New Zealand.—Arrivals during the past fortnight total 66,190 carcasses. The demand for New Zealand mutton seems to go from bad to worse, and although supplies are not heavy, the requirements of the market are so limited that a further reduction in price has to be recorded.

Australian.—Importations for the past two weeks are 15,728 carcasses. The position of this description remains practically unaltered, recent arrivals not yet having been placed on the market. Under these circumstances quotations are only normal at 3¾d. for small carcasses, to 3d. @ 3¼d. for the heavier weights.

Lambs.—Arrivals during the fortnight amount to 15,278 carcasses from Australia, 131,710 carcasses from New Zealand, and 29,825 from River Plate. The market for lambs has a firmer tendency, and prices show slight advances as compared with those ruling a fortnight ago. Prime Canterbury lambs of all weights may be quoted to-day firm at 5½d. and secondary at 5d. @ 5¼d.

Australian lambs are now very scarce, the few available being only of secondary quality, for which 4½d. (@ 4¾d. is being made.

Beef.—Frozen.—Arrivals during the past two weeks amount to 4,005 quarters from Australia, 6,304 quarters from New Zealand, and 49,059 quarters from the River Plate. Further declined at 2¾d. (@ 2⅞d. fores, 3⅞d. (@ 3½d. hinds for Australian, 2⅞d. (@ 3d. fores, and 3½d. (@ 3⅞d. hinds for New Zealand, and 2⅞d. fores, 3½d. hinds for River Plate.

Provincial Markets.—Trade in lambs has been fair, but for beef and mutton the demand is disappointingly slow. Quotations for lambs are firmer, while mutton and beef are lower.

COLONIAL DAIRY PRODUCE.

Messrs. W. Weddel & Co., under date London, June 5th, make the following weekly market report:—

Butter.—The heat of the current week has been that of full summer, and there have been many violent thunderstorms. Pastures are improving, and the milk supply is now at about its maximum.

The market for Australian and New Zealand butter is gradually becoming neglected, and this quality of butter is being replaced by retailers with Irish, French, Dutch, and other Continental varieties. Shipments this week from Australia are only 100 boxes. Arrivals have been about 10,000 boxes. For the first five months of 1908, January to May inclusive, the imports of Australian butter have been 11,737 tons less than in 1907, and of New Zealand 3,205 tons, while from Canada there has been an increase of 39 tons. Prices of Australian and New Zealand remain firm at last week's prices owing to the supplies of butter being only just enough to fill the demand.

Foreign butters, as well as home-made, are increasing on our markets, but there is no chance for a week or two of the supply exceeding the requirements of the trade.

Cheese.—There is no increased interest in this market, nor will there be for a week or two.

— — —
Messrs. Elder, Smith, & Co., Limited, report July 1:—

Wool.—Judging by letters received this week there is a much better feeling amongst consumers of wool in Bradford; the downward tendency of the market has been checked and confidence restored, hence the improved demand at the close of the May series as compared with the opening of those sales. Our London manager, writing under date June 29, says:—"We now make the position of merinos about unchanged from the closing rates of March sales for good and medium greasies and good scoureds, but medium and faulty scoureds and inferior greasies are 7½ per cent. cheaper than at that time. In cross-breds the fluctuations have been considerable; they opened with about 10 per cent. decline, and are now closing about 10 per cent. higher than at the end of the March sales."

Sheepskins.—Recent cables from our London office report a stronger demand for all sheepskins, values for crossbreds showing a greater improvement than for merinos. This improvement had been anticipated by local buyers, and rates here for the past five or six weeks have been very satisfactory. Bid-

ding at our sale on Friday last was brisk, and a more confident tone was noticeable, although in a few instances only can higher rates be recorded. Full-woolled merino skins and some light-conditioned lots of good length of staple made a shade above previous quotations, but anything below half-wools showed no improvement. Crossbreds met with a strong demand, and values were about $\frac{1}{4}$ d. per lb. higher all round. The bulk of the skins now coming in are clean-woolled and free from seed. We offered 5,800 skins and sold 5,000 at the undermentioned rates:—

Best South-Eastern merinos, from $5\frac{1}{2}$ d. to 6d.

Light-conditioned Northern merinos, 5d. to $5\frac{3}{4}$ d.

Heavy-conditioned lots, from $4\frac{1}{2}$ d. to 5d.

Seedy skins, from 4d. to $4\frac{3}{4}$ d.

Quarter to half woolled lots, from $3\frac{1}{2}$ d. to 4d.

Fine crossbreds, from 5d. to $5\frac{1}{2}$ d.

Coarse crossbreds, from 4d. to $4\frac{3}{4}$ d.

Lambskins, from $4\frac{1}{2}$ d. to 5d. per lb.

Weevil-damaged and badly-cared-for lots, from $3\frac{1}{2}$ d. to 4d. per lb.

The following prices were obtained for our principal lots on Friday last:—

Three-quarter to full-woolled Merinos—41 at 7s. 4d., 28 at 6s. 8d., 134 at 6s. 5d., 112 at 6s., 25 at 5s. 9d., 72 at 5s. 2d., 58 at 5s. 4d., 225 at 5s. 3d., 111 at 4s. 10d., 98 at 4s. 9d., 204 at 4s. 5d., 107 at 4s. 4d., 152 at 4s. 3d., 118 at 4s. 1d.

Half to three quarter woolled Merinos—119 at 3s. 10d., 120 at 3s. 7d., 67 at 3s. 5d., 80 at 3s. 4d., 50 at 3s. 2d., 216 at 3s. 1d., 42 at 2s. 9d., 62 at 2s. 3d., 33 at 2s. 1d.

Quarter-woolled Merinos—65 at 2s. 3d., 54 at 2s. 1d., 102 at 1s. 10d., 779 at 1s. 2d., 109 at 1s. 1d.

Damaged Merinos—67 at 4s. 7d., 91 at 3s. 2d., 60 at 2s. 4d., 249 at 2s. 2d., 101 at 1s. 5d., 222 at 1s. 3d., 71 at 5d.

Crossbreds and Lambskins—31 at 4s. 6d., 107 at 4s. 4d., 26 at 4s. 3d., 38 at 3s. 11d., 55 at 3s. 7d., 50 at 3s. 2d., 15 at 2s. 11d., 37 at 2s. 8d., 26 at 2s. 7d., 26 at 1s. 6d.

METROPOLITAN MARKETS.

The Producers' Market, Limited, report for July 10:—Fruit: Large supplies forward again to-day. A splendid show of citrus fruits being offered to a very large and representative audience. Many lines of prime apples, particularly Yates' and Rome Beauties, were very keenly competed for. We also sold a splendid line of Cleopatras at very satisfactory prices. The following sales were effected:—Apples, prime Yates, 10s. 6d. to 14s. 9d.; Rome Beauties, best, 9s. 6d. to 12s., medium, 8s. to 9s.; Cleopatras, best, 8s. 9d. to 11s. 6d., medium, 6s. 9d. to 8s. 3d.; Rokewoods, best, 7s. 6d. to 10s. 9d., medium and inferior, 5s. 6d. to 7s. 3d.; Jonathans, ex store, 9s. to 12s. 6d.; Dunn's Seedling, 9s. to 11s. 9d.; other varieties, best, 8s. to 10s. 6d., medium and inferior, all classes, 5s. to 7s. 9d.; pears, best dessert, 11s. to 16s., medium, 6s. 9d. to 9s. 6d.; oranges, best Washington Navels, 9s. 6d. to 13s. medium and inferior, 5s. 6d. to 8s. 9d.; ordinary oranges, best, 4s.

9d. to 6s. 6d., medium and inferior, 3s. to 4s. 3d.; Seville oranges, 3s. 6d. to 5s.; lemons, best grades, 7s. 6d. to 8s. 9d.; ditto, large, 4s. to 6s.; mandarins, best, 10s. 6d. to 16s., medium and inferior, 4s. 6d. to 9s. 6d.; Cape gooseberries, 3½d. to 5¾d. Vegetables: market absolutely full, large attendance of buyers, competition being keen throughout the sale. Cabbage, 1s. 9c to 3s. 6d.; ditto, red, 9s.; ditto, Savoy, 2s. 9d. to 3s. 6d.; cauliflowers, 4s. to 6s., other from 1s. upwards; pumpkins, huggle, 2s. 6d. to 3s. 6d., ironbark, 5s. 3d. to 6s. 6d.; celery, 1s. to 1s. 11d., small from 6d.; rhubarb, ¾d. to 1¾d.; lettuce, 1s. 3d. to 2s. 2d., others from 7d.; bunch lines, 1s. 10d.; inferior lines from 6d.; potatoes, new, 12s. to 16s. 6d., sweet, ¾d. to 1½d.; Swedes, 5s. 3d. to 6s. 6d. Poultry, etc.: A splendid show of prime table birds and laying hens to hand. We sold as follows:—Best table birds, 6s. 6d. to 8s. 6d., medium, 5s. to 6s. 6d., inferior, 3s. 6d. to 4s. 3d.; hens, best laying, 6s. 6d. to 8s. 6d., medium, 4s. 6d. to 5s. 9d., inferior, 3s. 3d. to 4s.; ducks, best Muscovies, 6s. 6d. to 9s., medium, 5s. to 6s. 3d.; common ducks, 6s. 6d. to 7s. 9d., medium, 5s. 6d. to 6s. 3d.; turkeys, gobblers, prime birds, 15s. to 18s. 6d., medium 12s. 6d. to 14s. 9d.; hens, 8s. 6d. to 10s. 6d.; geese, 8s. 6d. to 11s. 6d.; guinea fowls, 4s. 6d. to 5s. 9d.; pigeons, 1s. 4d. to 1s. 6d. Pure-bred sale, Thursday 9th. Large consignment forward: splendid attendance of buyers, both from the country and suburbs. Best Indian Runners, 8s. to 12s. 6d.; Pekin, 8s. 6d. to 12s. 6d.; geese, best known breeds, 13s. 6d. to 17s. 6d.; fowls, best White Leghorns, 7s. to 11s., cockerels, 5s. to 10s. each; Brown Leghorns, 7s. 6d. to 12s. per pair, inferior, 5s. to 6s. 6d.; Buff Orpingtons, hens, 4s. to 6s. 6d. each, cockerels, 5s. 6d. to 8s. 6d. each; Silver Wyandottes, best hens, 8s. 6d. to 12s. 6d., cockerels, 6s. 6d. to 10s. 6d. each; White Wyandottes, hens, 4s. 6d. to 6s. 6d. each, cockerels, 6s. to 10s. each; other strains equal to above prices. Pork, good supplies, prime, 6¾d. to 7¼d., other, 5½d. to 6d., large, 3d. to 4½d.; eggs, 1s. 9d. to 2s. 0½d.; ducks, 1s. 7d. to 1s. 9d., country 1s. 8d. to 1s. 10d.; honey, 11s. 6d. to 14s. 6d.

The W.A. Producers' Union, Ltd., report as follows for July 10:—Supplies were very light again this morning, only eight trucks being yarded. Best quality of chaff forward was not above f.a.q. standard, and for lots of such quality £6 was returned in three instances. At £5 12s. 6d. one good medium sample sold, while a slightly damaged lot brought £5. Straw again this morning brought £2 2s. 6d., while one bad lot of wheat gained 3s. 5½d. The following trucks were sold at undermentioned prices:—No. 6189, Edward's Crossing, £6; 6067, Narrogin, £6; 1107, East Northam, £5 12s. 6d.; 3863, Burke's Siding, £5; 3814, Beverley, £3 7s. 6d.; 1445, East Northam (straw), £2 2s. 6d.; 2483, Wagin (wheat), 3s. 5½d. Truck No. 1867, ex Burges' Siding, was passed in at £6.

Melbourne Produce Market, Melbourne, July 10.—Oats, 3s. 3d.; maize, 4s. 2¼d. to 4s. 2½d.; chaff, £7; hay, £7; potatoes, £4 to £5 5s.; onions, £7 to £7 5s.

Adelaide Produce Market, Adelaide, July 10.—Wheat is steady, parcels being quoted at 3s. 11d. f.o.b.; flour, £8 10s. f.o.b.; bran and pollard, 1s. 1½d. f.o.b.; Algerian oats, 3s. 1½d.; Cape barley, 3s. 10d. to 4s.; English malting barley, 4s. 3d. to 4s. 4d.; chaff, £6 f.o.b.; best butter, 1s. 4d. to 1s. 5d.; eggs, 1s. 0½d. to 1s. 1d.

FROZEN MEAT EXPORTS.

The *Pastoralists' Review* for June states:—The clearances of frozen meat from the Commonwealth to all oversea ports during May were only moderate: they totalled 50,836 carcasses mutton, 41,160 carcasses lamb, and 14,535 quarters beef. These figures when compared with those for April show a decrease in mutton of 4,000 carcasses, and of 15,000 carcasses of lamb, but a small increase in beef of 1,100 quarters. When placed alongside the total for the corresponding month of last season, May, 1907, an increase in lamb of 29,000 carcasses is noticeable, with a decrease in mutton equal to 45,000 carcasses, and of beef equal to 16,000 quarters.

An analysis of the various shipments for the month under review shows that most of the meat, viz., 39,787 carcasses mutton, 41,401 of lamb, and 250 quarters of beef were consigned to Great Britain. Of the balance, South Africa received 8,251 carcasses mutton, 200 lambs, and 1,200 quarters beef, while 2,798 carcasses mutton, 559 lambs, and 13,685 quarters of beef were shipped to various ports in the East, etc.

New South Wales exporters were the heaviest shippers for the month, they being responsible for 20,139 sheep, 16,188 lambs, and 230 quarters beef. Victoria came next with 13,235 carcasses mutton, and 23,883 lambs, and Queensland sent away 17,462 carcasses mutton, 1,089 carcasses lamb, and 14,315 quarters beef.

During the period from July to December last year, the exports from West Australia consisted of 15,045 carcasses lambs.

EDITORIAL REQUEST.

Correspondence and Queries are invited from subscribers and readers of the Journal on any subject of interest to agriculturists and other settlers on the land, either conveying useful information or seeking it. Suitable letters and contributions will be published and answers to queries given in the succeeding issue, if communications are received by the Editor not later than the fifteenth of each month.

Secretaries of Agricultural Associations, Societies, and Farmers' Clubs are kindly requested to supply corrections of the lists published in the Journal, such as changes of appointments, dates of shows and meetings, as well as any other items of interest.

Rainfall for the month of June, 1908, recorded at telegraphic stations in Western Australia, and averages.

STATIONS.	Total for June, 1908, in points. 100 points=in	No. of wet days.	Average for June.	STATIONS.	Total for June, 1908, in points. 100 points=in	No. of wet days.	Average for June.
TROPICS :				NORTH COOLGARDIE			
Wyndham ...	Nil	...	13	FIELDS :			
Turkey Creek ...	Nil	...	27	Sandstone ...	212	9	...
Hall's Creek ...	Nil	...	20	Wiluna ...	103	7	100
Fitzroy Crossing...	22	2	52	Mt. Sir Samuel ...	161	8	92
Derby ...	13	1	64	Lawlers ...	127	8	135
Broome ...	17	1	128	Mt. Leonora ...	107	9	131
La Grange Bay ...	98	1	126	Mt. Malcolm ...	90	6	125
Wallal ...	283	1	121	Mt. Morgans ...	99	7	112
Condon ...	245	6	97	Laverton ...	78	6	132
Bamboo Creek ...	352	5	149	Murrin Murrin ...	90	6	130
Marble Bar ...	201	5	93	Yundamindera ...	119	7	97
Warrawoona ...	128	3	85	Kookynie ...	125	9	108
Nullagine ...	145	4	70	Niagara ...	117	7	152
Port Hedland ...	676	6	119	Menzies ...	218	8	141
Whim Creek ...	483	6	149	Mulline ...	157	8	106
Roebourne ...	720	7	97				
Cossack ...	663	6	102	COOLGARDIE GOLD-			
Fortescue ...	303	6	120	FIELDS :			
Onslow ...	258	5	163	Davyhurst ...	135	6	129
Winning Pool ...	445	7	244	Goongarrie ...	137	7	114
WEST COASTAL :				Broad Arrow ...	142	11	124
Carnarvon ...	601	5	271	Kurnalpi ...	131	5	124
Sharks Bay ...	336	6	226	Kanowna ...	120	10	120
Wooramel ...	402	6	195	Bulong ...	105	6	115
Hamelin Pool ...	256	6	186	Kalgoorlie ...	146	8	130
Northampton ...	355	10	485	Coolgardie ...	135	10	113
Mullewa ...	242	8	227	Burbanks ...	123	6	131
Geraldton ...	470	14	416	Widgemooltha ...	126	7	139
Greenough ...	513	7	508	Norseman ...	176	8	126
Dongarra ...	449	9	480	Boorabbin ...	121	7	168
Minginew ...	258	12	377	Southern Cross ...	107	8	140
Carnamah ...	244	9	320				
Dandarragan ...	421	10	451	S.W. COASTAL :			
Moora ...	358	11	373	Gingin ...	660	11	598
Walebing ...	331	12	377	Guildford ...	574	14	632
New Norcia ...	236	11	415	Perth Gardens ...	622	14	651
MURCHISON FIELDS				" Observatory ...	681	14	656
Peak Hill ...	102	10	125	Fremantle ...	632	15	572
Abbotts ...	206	5	118	Rottneat ...	710	15	592
Gabanintha ...	194	5	94	Rockingham ...	744	14	614
Nannine ...	269	7	116	Jarrahdale ...	919	10	840
Cue ...	296	9	145	Mandurah ...	942	14	754
Day Dawn ...	297	7	126	Pinjarrah ...	1057	11	768
Lake Austin ...	381	8	130	Collie ...	791	16	663
Lennonville ...	242	7	89	Bunbury ...	742	14	715
Mt. Magnet ...	200	7	126	Donnybrook ...	796	15	703
Yalgoo ...	98	7	171	Busselton ...	803	20	571
Murgoo ...	281	8	192	Cape Naturaliste	641	16	...

RAINFALL—continued.

STATIONS.	Total for June, 1906, in points, 100 points=in.	No. of wet days.	Average for June.	STATIONS.	Total for June, 1906, in points, 100 points=in.	No. of wet days.	Average for June.
S.W. COASTAL—continued.				S.W. INLAND—continued.			
Karridale ...	882	19	841	Broomehill ...	260	12	278
Cape Leeuwin ...	683	24	633	Kojonup ...	372	16	343
S.W. INLAND:				Greenbushes ...	718	14	680
Kellerberrin ...	173	7	215	Bridgetown ...	633	17	595
Meckering ...	426	9	277	SOUTH COASTAL:			
Newcastle ...	355	11	389	Mt. Barker ...	453	18	537
Northam ...	290	12	314	Albany ...	589	23	430
York ...	346	13	327	Breaksea ...	500	24	375
Beverley ...	434	12	281	Bremer Bay ...	642	20	363
Wandering ...	445	12	443	Hopetoun ...	384	18	221
Pingelly ...	343	11	307	Ravensthorpe ...	147	16	144
Narrogin ...	338	15	331	Esperance ...	801	19	399
Marradong ...	572	14	574	Israelite Bay ...	208	22	198
Williams ...	388	12	385	Balladonia ...	131	12	118
Arthur ...	360	10	341	Eyre ...	234	11	176
Wagin ...	356	11	309	Eucla ...	...	...	...
Katanning ...	213	12	267				

E. B. CURLEWIS,

Divisional Officer for W.A.

REMARKS ON THE RAINFALL FOR THE MONTH.

The rainfall was in excess of the average throughout the N.W. division, the Gascoyne with the exception of Peak Hill and Yalgoo, which were slightly below; the S.W. division from Gingin and Meckering southwards, except between Katanning and Mt. Barker; the whole of the Eucla division, and the Goldfields between Coolgardie and Kookynie. In the N.W. the excess ranged from 43 points at Warrawoona to 623 at Roebourne, the latter place registering 720 points for the month. The excess in the Gascoyne varied from 70 points at Hamelin Pool to 330 at Carnarvon, which recorded 601 points for the month, whilst the excess in the S.W. and Eucla divisions, and portions of the Fields ranged from 2 points at Wandering to 402 at Esperance, 801 points being recorded there during the month. Throughout the rest of the State, viz. the Kimberley district, North Coolgardie and portion of the Coolgardie Goldfields and the Central West Coastal district between Dongarra and New Norcia, was below the average, varying from 7 points at Lawlers to 179 at New Norcia. No rain fell during the month in the East Kimberley district. The heaviest fall during the month in the S.W. was recorded at Pinjarrah—1,057 points.



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1908.

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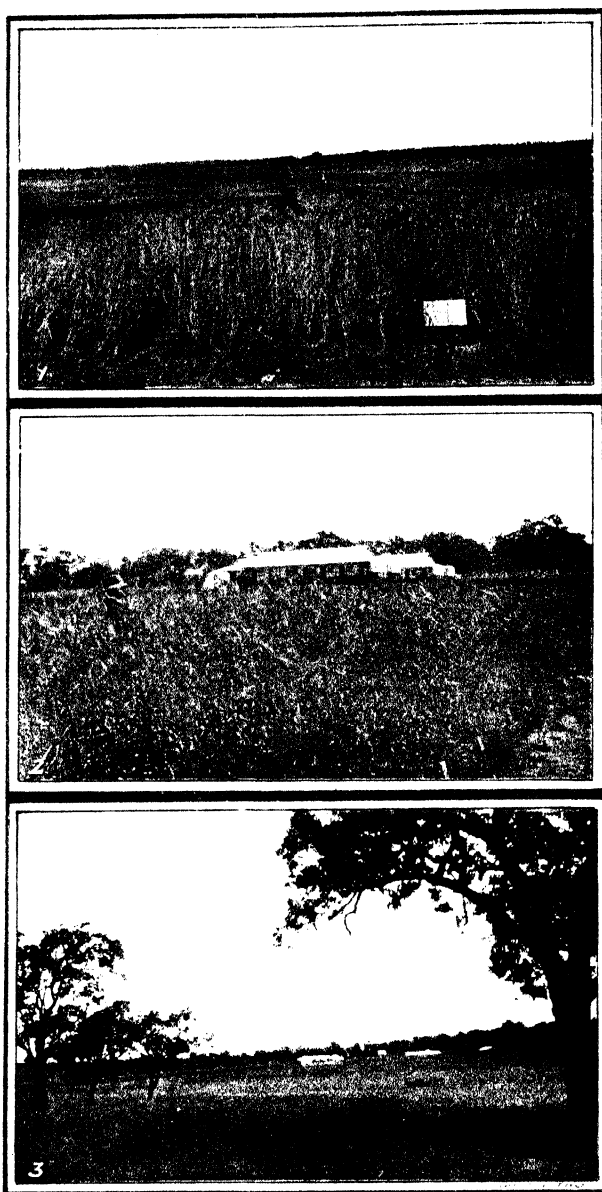
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Canyon State Farm
 1. Field of Growing Wheat.
 2. Wheat Field and Farm Buildings.
 3. View of Farm.

JOURNAL

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Department of Agriculture

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Part 2.

NOTES.

New Zealand Cereal Crops.—The actual yields of the cereal crops in New Zealand for 1907-8 were:—Wheat, 28.84 bushels per acre; oats, 38.52 bushels, and barley, 32.15 bushels.

Sheep in New Zealand.—According to the latest official return by the Secretary for Agriculture, the number of sheep in the Dominion on April 30 was 22,124,202, being an increase on 1907 of 1,110,430.

Rabbits in the Isle of Man.—Owing to the enormous increase of rabbits in the Isle of Man and their menace to agriculture, the House of Keys has passed a Bill constituting them vermin, and empowering owners of land and other persons to carry a gun without a license in order to effect the destruction of the pest. A similar provision was carried applying to rooks.

Standard for Condensed Milk.—At the Conference of the British Dairy Farmers' Association held at Derby, England, the following resolution was adopted:—“That as it has been shown that a large percentage of infantile mortality is due to insufficient nourishment arising from the use of condensed skim milk, it is desirable that a standard should be fixed by the Board of Agriculture for condensed milk.”

Large Black and Berkshire Pigs.—Mr. Herbert Garratt, proprietor of the Loch Maree stud of British Large Black and Berkshire pigs, has forwarded to us a copy of a neat illustrated handbook published by him treating on the utility, value and breeding of those classes of baconers. Mr. Garratt regards them as the best kinds of pigs for Australian breeders, and gives much useful information on the subject in his little publication.

How to get the Pig's Weight.—To tell the weight of swine measure the girth in inches back of the shoulder, and the length in inches from the square of the rump to a point even with the point of the shoulder-blade. Multiply the girth and length, and divide the product by 144. Multiply the result by 11 if the girth is less than 3ft., or by 16 if over 3ft. The answer will be the number of pounds of pork. If the animal is lean and lank a deduction of 5 per cent. from the above should be made.

Extensive Deposits of Phosphates in Society Islands.—An enormous deposit of phosphate of lime is reported to have been discovered on the Society Islands group, in the Pacific, which are French possessions. The British Consul at Tahiti states that it is estimated that on one alone there are fully 30,000,000 tons available, which give an analysis of from 66 to 90 per cent. of pure phosphate of lime. It will be remembered that these islands were discovered by the great English navigator, Captain Cook.

Prevention of Bee-moths.—A correspondent states that the most effective way to clear the hive of bee-moths is to introduce Italian queens into the apiary. They will hybridise from the common black bee, and the progeny is of so fierce a nature that they will speedily destroy the whole larvæ of the moth. This has been proved by experiments made by bee-keepers in this State, and the information will, no doubt, be of value to others. The hybrids possess a yellow band across the body, inherited from the Italian queen.

Boyanup Citrus Show.—The second annual citrus show of the Boyanup Farmers' and Progress Association was held in the Agricultural Hall on July 26, and was a very successful exhibition, the exhibits exceeding the previous year's by 120. The Premier, Mr. N. J. Moore, when declaring the show open, impressed upon growers the importance of growing what consumers require. A few years ago a few fruit trees only would be seen at farm-houses, now acres of them could be seen, especially in the South-West districts. At the present time there were 16,000 acres under orchards.

A Double Hybrid Fruit.—An extraordinary berry, obtained by scientific hybridisation, has been produced by a firm of horticulturists, Messrs. Hugh Low, Middlesex. It was obtained by first crossing the raspberry with the blackberry. The resulting fruit, known as the loganberry, was crossed once again with the blackberry, and, therefore, consists of two parts blackberry and one part raspberry. It combines the flavour of both fruits, and is declared to be excellent for jam-making. The new berry was on view at the Holland House Flower Show, where it attracted great attention.

South Australian Agricultural Acts.—Messrs. Elder, Smith, & Co., Ltd., Adelaide, have forwarded us a neat little pamphlet containing a synopsis of the following Acts passed by the State Legislature, viz.:—The Pastoral Act, 1904; Crown Lands Acts, 1903 and 1905; Stock Diseases Act, 1888; Impounding Act of 1858; Vermin Acts, 1905 and 1907, and Shearers' Accommodation Act, 1905. The compilation was carried out by Messrs. G. and I. Downer, the object being to convey in condensed form, to persons engaged in landed pursuits, the most salient points in those measures which affect their interests.

West Indian Cotton Industry.—There is no doubt that the impetus given during late years to cotton-growing has saved many islands of the West Indies from decadence. With the assistance of the Imperial Department of Agriculture the industry has made enormous strides. For example: In Barbadoes in 1903 there were only 16 acres under cultivation, the value of the crop being £300. Last year the area under cultivation was 5,000 acres, and the value of the lint and seed reached £76,876. This year the estimates of the crop are 6,935 acres with a yield valued at £100,000, with a lowered market. There have been corresponding increases in other islands.

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Butter exhibits at the Royal Show.—The Minister for Agriculture, Hon. Jas. Mitchell, offers a prize of ten guineas for the two best 56lb. boxes of Western Australian made butter. The exhibits are to be packed in boxes made from our native timber (which will be supplied by the Department, on application), and must be delivered at the Government Cool Stores thirty days before the opening of the Show. Competitors are required to submit samples of the butter intended for exhibition to the Government Analyst in order that he may ascertain if the article compares in quality with the standard of the best class of Australian export butter.

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Inflammation of Cows' Udders.—Mammitis, an inflammation of cow's udders, causing a form of diphtheria in human beings, has been successfully treated by a German specialist by means of injections. The disease germs gain admission through the milk canals, and the German therefore attacked them along the same channels. He first thoroughly milked the udder and then cleansed it with warm soapsuds and a 3 per cent. solution of creolin. After the udder had dried, injections were made into the milk cisterns with solutions containing 5 per cent. creolin or camphorated oil. The treatment was repeated three times daily and in nearly all cases brought about prompt improvement.

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Fruit Industry in Australia.—*The Fruit World*, writing on the progress of fruit cultivation in Australia, states that there are in the whole of the Commonwealth a total of over 218,860 acres under the industry (exclusive of private and market gardens). Over 47,477 acres are under apples, of which quite 22,000 acres are yet to come into bearing; vines, 62,557 acres; citrus (mainly oranges), 24,301 acres; the balance being divided between peaches, apricots, pears, plums, bananas, pineapples, strawberries, passion fruit, etc. Western Australia and South Australia have more acres under apples than Tasmania; Victoria has over 20,000 acres, or more than 7,000 acres in excess of Tasmania, and between them, it is estimated that after supplying home consumption, there will be 1,594,884 bushels available for export.

— — — — —
Western Australia's Fruit Production.—Reviewing the fruit industry of Australia, *The Fruit World* says:—"Judging from Western Australia's greater proximity to the European and Indian markets, great prospects are in store for her progressive and able orchardists. It is true that this State will be able to export a week or two earlier than the Eastern States, but any handicap in time the Eastern States will quite restore when the Panama Canal in America is open for traffic. However, apart from any such anticipa-

tions, Western Australia will prove a leader in the production of fresh, dried, and canned fruits for export. Her climate assures it; her vast areas of the kindliest of soils with good average rainfall ensure it. Albany, in the South, will one day be the Hobart of Western Australia with a fruit country behind it equal to three and four Tasmanias."

Australian Apples in Germany.—We have received through the Agent-General Messrs. Lohmann & Co.'s report of the sales of Australian apples in Hamburg on 31st May last. In all more than 20,000 cases, per s.s. "Oberhausen," were sold, in addition to 2,278 cases of Tasmanian apples, shipped in the s.s. "Schwaben." Of these the firm claim that those consigned to them by their Australian agents realised the highest prices. Messrs. Lohmann & Co. further state that although the fruit forwarded to the prize exhibition was of good quality and the packing carefully done, still none secured the highest possible number of points, viz, 72, the best only attaining 57 points. The Tasmanian apples were of very good quality but suffered from the hot weather during the voyage, and had to be sold quickly, consequently they did not realise as good prices as they would have otherwise.

The Mule Industry.—The mule industry is annually assuming increased importance in animal husbandry as the serviceable qualities of this general utility animal become better understood. There are 3,869,000 mules in the United States, valued at 416,939,000 dols., or an average per head of 107.76. Texas leads with 637,000, Missouri second with 321,000, and Tennessee third with 284,000 mules. Formerly the mule was restricted to use in the mines and in conducting southern agricultural operations, but more recently the mule has won a place in the teeming industry of northern cities and work on northern farms. Every leading wholesale horse market in the States is now featured with a mule department, as the demand constantly broadens in all parts of the country for commercial use. The vicious attributes of mules have been exaggerated. They are preferred for field work on southern plantations because they are more docile and tractable than horses. They are easily broken to harness, and work cheerfully and patiently at tasks that would provoke rebellion in horses.

Encouraging Egg-production.—Poultry-farming is one of the most valuable as well as generally interesting sub-industries which enter within the field of food production of the world. Now-a-days it has become an object of promotion by the State, and in this direction the Agricultural Department of Western Australia has been in the foreground in offering every encouragement to the industry, especially in organising the egg-laying competitions at Subiaco and Narrogin. We are very pleased to notice that the success which has attended these contests has infused a similar spirit of encouragement to manifest itself in other influential channels, the enterprising proprietors of the *Sunday Times* newspaper having come forward with a novel offer to its readers. The journal offers to every person forwarding the sum of 14s. for a twelve months' subscription to the paper a setting of White Leghorn eggs valued at one guinea, the product of Sunnyhurst-Padman hens bred by Mr. Parkes, of Bunbury. Such a generous offer should have the desired effect of stimulating egg-production, and will, no doubt, be very largely availed of.

Manuring Tobacco.—Professor Wagner, Darmstadt, Germany, has published results of experiments in the fertilising of tobacco plants, and deals with the relation between manuring and the quality of the tobacco, showing the importance of potash on the quality of the leaf. It is found that the burning capacity of tobacco is improved by potash and deteriorated by chlorine. The higher the percentage of potash in the fermented leaves the better the glowing properties.

Percentage of potash.	Duration of glow.
1.74 — 3.98	32secs.
6.03 — 7.04	55secs.
Without potash manuring	25secs.
With potash manuring	46secs.

A high potash and low chlorine, however, are not the exclusive condition under which tobacco shows a long glowing durability, and *vice versa*. Quality of soil, climate, weather, variety of tobacco, treatment of plants, stage of ripening, and fermentation of leaves all influence quality. If the “burn” is to be excellent the leaves must contain at least 5 to 6 per cent. of potash, and not more than 6 per cent. chlorine in their dry substance. A tobacco crop should receive about twice as much potash as is necessary for the production of the highest yield.

GEOLOGICAL REPORT.

(Continued).

PHOSPHATE DEPOSITS OF CHRISTMAS ISLAND.

Appendices.

PHOSPHATIC FERTILISERS.

(By E. S. SIMPSON, Mineralogist and Assayer, Geological Survey of W.A.)

Of the many substances necessary to insure the healthy and vigorous growth of those plants upon which man depends so much for food and other supplies, there are only four which are not very generally present in all soils in abundant quantities. These four are water, phosphorus, nitrogen, and potash, the absence of the first of which in sufficient quantities necessitates some form of irrigation, the absence of one or more of the last three, some form of artificial fertilisation. This latter process consists in the addition to the soil of small quantities of substances containing a large proportion of the desired element. These fertilisers are largely of mineral origin, and derived from a source where the desired element is abundant and only partly or not

at all utilised. Thus coal beds contain nitrogen which is not of any value to plant life until during the preparation of gas it is converted into ammonia compounds rich in available nitrogen. Potash fertilisers are derived mainly from beds of potash salts buried at considerable depths in the ground in Germany. Phosphorus is derived from very many sources both organic (bones, guano, etc.) and inorganic (Thomas phosphate, etc.) The phosphorus in many of these fertilisers has a long and interesting history which will be considered after a statement of the main varieties of phosphatic material used as a source of fertilisers.

Class A (Primary minerals).—Apatite, amblygonite, etc., iron phosphates.

Class B (animal concentrations).—Bones, new and fossil, guano, bat guano, coprolite (in part).

Class C (Secondary minerals, the phosphorus in which was originally derived from materials of Class B).—Rock phosphate (lime phosphate), aluminium phosphate, iron phosphates, coprolite (in part).

Class D (Manufactured products).—Superphosphate, Thomas phosphate, precipitated phosphate, bone ash.

The ultimate source of all the phosphorus in these substances is those small amounts of apatite and other phosphates present in the rocks forming the crust of the earth. As the rocks weather these have been and are still being absorbed by vegetation, these again are food for animals which concentrate the phosphorus in the bones. Such bones being indigestible (*i.e.* fish bones) form a considerable proportion of the excreta of birds, reptiles, bats, etc., giving rise to deposits of guano, bat guano, and coprolite. Rain water acting on such deposits carries part of the phosphorus in solution down on to the surface of the underlying rocks where chemical interaction takes place with the formation of one of the many forms of "rock phosphate" according to the nature of the original rock, lime phosphate rock when limestone, aluminium phosphate rock when aluminous lava or granite, iron phosphate rock when ironstone or ferruginous lava. The coprolite of this class is also formed by precipitation from water of dissolved phosphate of lime. The relative value of phosphatic material depends upon its solubility in water, in dilute carbonic acid and in saline solutions, since it is only when dissolved in the water of the soils that it can be absorbed by the plant. The naturally occurring material, with the exception of guano, bat guano and bone, are almost wholly insoluble and only when finely ground do they show any appreciable effect on vegetation, and that effect is spread over a long period of time owing to the slowness of solution. They have therefore to be subjected to certain processes with a view of increasing their solubilities. In this connection the solubility of the chief compounds occurring in the crude and manufactured fertiliser must be considered; these are:—

Tricalcium phosphate.—Practically insoluble in water, dilute carbonic acid and saline solutions. It is the chief constituent of apatite, bone, bone-ash, coprolite, and linerock phosphate. Occurs to some extent in guano.

Dicalcium phosphate.—Practically insoluble in water but readily attacked by dilute carbonic acid or many saline solutions. Occurs in guano, bone, bone dust (desiccated bone, etc.), and forms main constituent of "Precipitated phosphate." Forms slowly in superphosphate when stored.

Monocalcium phosphate.—Readily soluble in water. Chief constituent of superphosphate.

Basic Lime phosphate.—Practically insoluble in water, but attacked by carbonic acid and saline solutions. This is the important constituent of "Thomas phosphate" or "Slag phosphate."

Aluminium phosphate is practically insoluble. It occurs in many rock phosphates both by itself and in conjunction with iron phosphates and tricalcium phosphate. In superphosphate made from aluminous calcium phosphates more or less of it occurs, especially with the lapse of time.

Iron phosphates of several varieties are known, all insoluble. They occur in phosphatic iron ores from which Thomas phosphate is prepared, in many rock phosphates, and in superphosphate in a similar way to aluminium phosphate.

The important constituent of all these compounds is the compound of phosphorus and oxygen known as phosphoric oxide, or more commonly but incorrectly phosphoric acid.

This constituent has three different market values according to its solubility. Recent Perth rates were per unit (one per cent.) per ton:—

	s. d.	
Water soluble	5	2
Citrate soluble*	3	10
Insoluble	2	7

Owing to the low price of the insoluble phosphoric oxide and its slow action on vegetation it is very desirable that most crude phosphatic material should be treated so as to convert the common insoluble form into the form soluble in water or saline solutions.

The most important of these manufactured fertilisers rich in water soluble phosphoric oxide is "Superphosphate." This substance is prepared by the action of sulphuric acid on a high grade natural calcium phosphate, the final product consisting mainly of a mixture of monocalcium phosphate (soluble in water) and gypsum. In this process approximately equal weights of acid and rock are mixed together, and nothing removed by washing so that the resultant superphosphate contains a percentage of phosphoric oxide just half of that in the original rock. For this reason, if for no other, it is necessary to have a high-grade raw material, the lowest limit to produce a saleable "super" being about 25 per cent. phosphoric oxide. Superphosphate can only be made from a lime phosphate material, and not from an iron or aluminium phosphate. Small proportions of the oxides of iron and aluminium up to 2 or 3 per cent. do not appreciably affect the value of a rock phosphate, but above that point they decrease its value for the making of superphosphate since the manufactured product is found to develop with lapse of time insoluble phosphates of these metals. A little calcium carbonate in the rock is advantageous as it renders the final product drier and more granular, but beyond 10 per cent. is a decided disadvantage as it consumes a large proportion of acid which would otherwise be usefully employed in converting insoluble into soluble phosphate. Other metallic compounds readily attacked by sulphuric acid such as magnesium carbonate, clay, etc., are objectionable constituents of rock for the same reason. Except that it lowers the general grade of the fertilisers, insoluble matter such as sand is no drawback to the crude rock.

*i.e. soluble in saline solutions.

Pure tricalcic phosphate when treated with the requisite amount of chamber acid will yield a superphosphate carrying 25 per cent. of phosphoric oxide. A good commercial superphosphate will contain from 15 to 20 per cent. of phosphoric oxide, necessitating 30 to 40 per cent. in the crude rock employed.

It is evident from what has been stated above that much crude phosphatic material is unsuited for conversion into superphosphate. Such material is utilised in one of three ways:—

(1.) Very fine grinding is resorted to and the crushed material used as a fertiliser without further treatment.

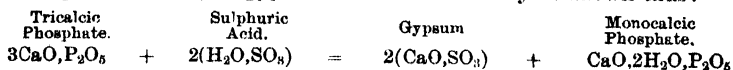
(2.) Iron ores containing appreciable amounts of phosphorus are smelted to form a pig iron rich in phosphorus, which in the process of conversion into steel yields Thomas phosphate slag, which only needs fine grinding to be available for fertilising. Deposits of iron and aluminium phosphates, or of low-grade calcium phosphates, could be utilised in this way by smelting with iron ores.

(3.) Similar crude material and phosphatic bye-products from other industries have in Europe been utilised by dissolving in acid and forming "Precipitated phosphate" by the addition of black ash from the alkali furnaces.

THE COMMERCIAL ASPECT OF PHOSPHATES AND SUPERS.

(By Dr. CHARLES CHEWINGS.)

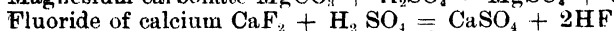
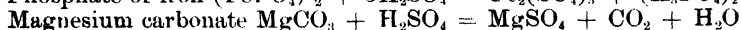
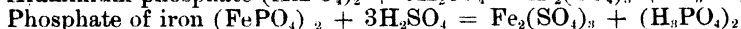
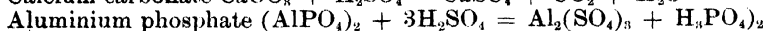
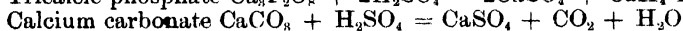
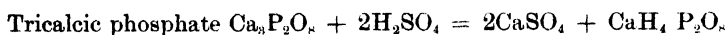
The thickness or depth of strata, its horizontal extension, accessibility, and conveniences for winning the rock, taken together with the percentage of tricalcic phosphate it carries (not less than 50 per cent. to 60 per cent.), and its freedom from an excess of the oxides of iron and aluminium, taken together are the points to be considered in determining the value of a phosphate rock deposit. The usual method of testing the value is to put boreholes down over the area 100ft. apart, and if the results warrant it to then sink pits 10ft. by 5ft., at intervals, 500ft. apart. Fifteen feet is the greatest depth boreholes are sunk on South Carolina, when, if no phosphate is encountered, other localities are tested. The value of a phosphate rock depends very largely on its suitability for making superphosphates therefrom. In the manufacture of superphosphates the phosphate is first ground to a fine powder; then mixed with sulphuric acid. The acid dissolves the phosphate, and two parts of the lime (which are combined with the phosphoric acid in the tricalcic form) are first set free and then combine with the sulphuric acid, making a hydrous and water-soluble phosphate, called a superphosphate, and a sulphate of lime, or gypsum. The reaction may be shown thus:—



There is also what is known as a "dicalcic" or "reverted" form that is insoluble in water, but readily soluble in ammonium citrate, as well as "available" to the roots of plants ($2\text{CaO}, \text{H}_2\text{O}, \text{P}_2\text{O}_5$). There is a tendency in Nature for the monocalcic form to revert to the dicalcic form, and again for

the dicalcic to revert to the tricalcic. It is said that when a superphosphate contains too much iron and alumina the tendency to revert is much accentuated, and for this reason are regarded as deleterious ingredients.

The sulphuric acid molecules' action on the constituent molecules in an ordinary phosphate rock is clearly shown in the following equations, given by Wyatt:—



In the preparation of superphosphate the percentage of phosphoric acid per ton of rock is reduced, roughly, by one-half, but the tonnage in superphosphate therefrom is about doubled by the sulphuric acid, water, etc., that is added in the making.

Superphosphates made from rock phosphate that carries a large quantity of iron and alumina have a tendency to revert, or become insoluble again; therefore the unit percentage of tricalcic phosphate is worth less in rock containing a good deal of these than rock containing only a little. Calcium fluoride in excess also reduces the value of a rock phosphate as it uses up too much acid; it forms sulphate of lime (gypsum) and adds weight, to the detriment of the superphosphate. Siliceous matter is a useless, harmless ingredient, adding unnecessary weight.

Phosphates carrying too much carbonate of lime are not good for making superphosphate, as they absorb too much acid. Some water must be added to form gypsum in the preparation of superphosphate. Some phosphates carry too little carbonate of lime. Tricalcic phosphate contains 45.81 parts by weight of phosphoric acid and 54.19 of calcic oxide. Iron, alumina, and magnesia may partially replace the lime in the raw rock, but the phosphate is always deteriorated thereby, particularly when iron and alumina are the replacing constituents. Wyatt states that next to insufficiency of phosphoric acid itself, a lack of *carbonate* of lime (not lime) is the most serious defect in a phosphate. The defect is augmented in the presence of iron and alumina in any form. By blending, the happy quantity of carbonate of lime can often be effected. Finely-powdered chalk will do, or any other source of cheap carbonate of lime. This method of drying (viz., by adding lime) is to be preferred to any roasting process: how could it (says Wyatt) when we know that the monocalcic or water-soluble phosphate of lime cannot exist in any other form than the hydrated state? Iron and alumina are not so obstructive if carbonate of lime is present in proper quantity. Calcining the rock before treating is harmful. Free lime retards the drying action, and of course calcium produces free lime by driving off the carbonic acid (treating carbonates with acids also releases the carbon dioxide); hence it follows that a phosphate rock from which super. is to be made should be completely chemically analysed, and not only the percentage of tricalcic phosphate and of iron and alumina determined. Phosphates from different localities are often mixed to get a good rock for high-grade super. Finest grinding of the material is absolutely essential.

The factor for converting phosphoric anhydride (P_2O_5) into phosphate of lime is 2.18; consequently $2.26 \times 2.18 = 4.92$ phosphate of lime.

For traders the following form may be found useful in buying:—"The unit per ton of $Ca_3P_2O_8$ not to be less than () and contain not more than () per cent. of Fe and Al, calculated as oxides, on the dry basis. Every unit of these oxides, singly or combined, in excess of maximum shall be deemed to neutralise two units of the phosphate of lime, and such excess shall therefore be deducted from the total phosphate of lime if found in the results of chemical analysis."

In commerce phosphoric anhydride (P_2O_5) is misleadingly referred to as phosphoric acid. Laboratory tests show that the phosphoric acid in bone, while insoluble in water, may be partly dissolved at a certain temperature by a neutral solution of ammonia citrate. This medium is used to determine what is called "available" in other phosphatic products. The rate of solubility in this medium is measured by the method of preparation of the bone and its fineness, the phosphate in a raw bonemeal of the same fineness showing rather a lower rate of solubility than the phosphates in steamed bone. The phosphate in finest steamed bone is much more soluble than that of the coarser grades. This measure of the rate of solubility of bone, while not, perhaps, showing the exact rate at which the plants may obtain it, is a fairly safe guide in its use for most crops, as compared with those mineral phosphates which are not perceptibly soluble in this medium. The range of solubility in different kinds and grades of bone is from 20 per cent. to 75 per cent., and the average of a large number show that about 30 per cent. is soluble in nitrate of ammonia, which would be called "available" if found in mixed fertilisers, and probably can be as safely depended upon as the "available" shown in other products.

Soluble Superphosphate means the percentage of tricalcic phosphate which has been dissolved, and *not* the percentage of monocalcic phosphate. In analysis terms: monocalcic phosphate of 17.3 per cent. is equal to tricalcic phosphate rendered "soluble," 27.2 per cent.; this means that it would require 27.2 per cent. tricalcic phosphate to furnish 17.3 per cent. of soluble phosphate. The former is called "soluble phosphate," and such a super. as the above would be described as containing 27.2 per cent. of soluble phosphate. In commercial transactions in mineral phosphates the "total available" only is regarded, the contents of insoluble being ignored.

Marketable superphosphate usually contains from 32 per cent. to 35 per cent. of bone phosphate, which contains some 17 per cent. of phosphoric acid, the phosphoric acid being in an "available" form. Bone ash superphosphates contain on the average about 16 per cent. of total available phosphoric acid. South Carolina rock superphosphates contain 12 to 14 per cent. of "total available," of which 1 per cent. to 3 per cent. is dicalcic or reverted. The sum of the soluble and reverted forms is called the "total available."

Florida superphosphates, from the pebble rock, often contain 16 per cent. or 17 per cent. of total available, with varying percentages of reverted and insoluble.

Tennessee superphosphates run up to 16 per cent. to 18 per cent. of "total available," and the concentrated or "double superphosphates" may contain as high as 45 per cent. of "available," practically all of which is soluble. It will thus be seen that bone phosphate (raw) of 60 per cent. and up-

wards will, when treated, produce a superphosphate containing a 30 per cent. and upwards bone phosphate, the half of which should be soluble in water, and the other half in ammonia citrate. The phosphoric acid contents of a 60 per cent. (or any other percentage) raw rock may be ascertained by multiplying the 60 per cent. by 46 per cent., that being the proportion of phosphoric acid in bone phosphate.

The phosphates mentioned above, with the exception of Thomas phosphate, constitute what are known as "raw materials." As a rule they are not used directly on the land, but are first subjected to chemical treatment to render the phosphoric acid constituent more soluble and assimilable by the plant. In the raw state, even if ground very fine, the bone phosphate is insoluble in water, and the phosphoric acid is not so readily available to the plant as when "treated" on account of the slow rate of decay of the raw material. The finer grinding of course the more rapid the decay, and this is the method adopted with phosphates that do not lend themselves readily to the manufacture of superphosphates, *e.g.*, when they have an excess of impurities such as alumina or iron, or the percentage of phosphoric acid is too low. Natural bones contain on an average about 20 per cent. of phosphoric acid (if good), which is equivalent to 43.60 per cent. of bone phosphate, but in certain cases 60 per cent. Ground bones are more readily attacked by the natural solvents air, water, and solvent substances in the soil than the mineral phosphates, but if the bones are "treated" the phosphoric acid contents become immediately available.

ASSAYER'S REPORT.

Mr. Edward S. Simpson, Mineralogist and Assayer, Geological Department of W. A., makes the following report on the "Determination of Associated Minerals in the Christmas Island phosphates":—

"The resinous-looking substance appearing in the brown phosphate rock from Christmas Island proves on examination to be essentially a fluor-apatite with a somewhat small proportion of calcium fluoride. It is contaminated with varying amounts of calcium carbonate, free silica, and organic matter. A precisely similar material has been noted in the West Indies and elsewhere associated with guano and underlying rock phosphates."

POULTRY NOTES.

By FRANK H. ROBERTSON.

LAYING OUT A POULTRY FARM.

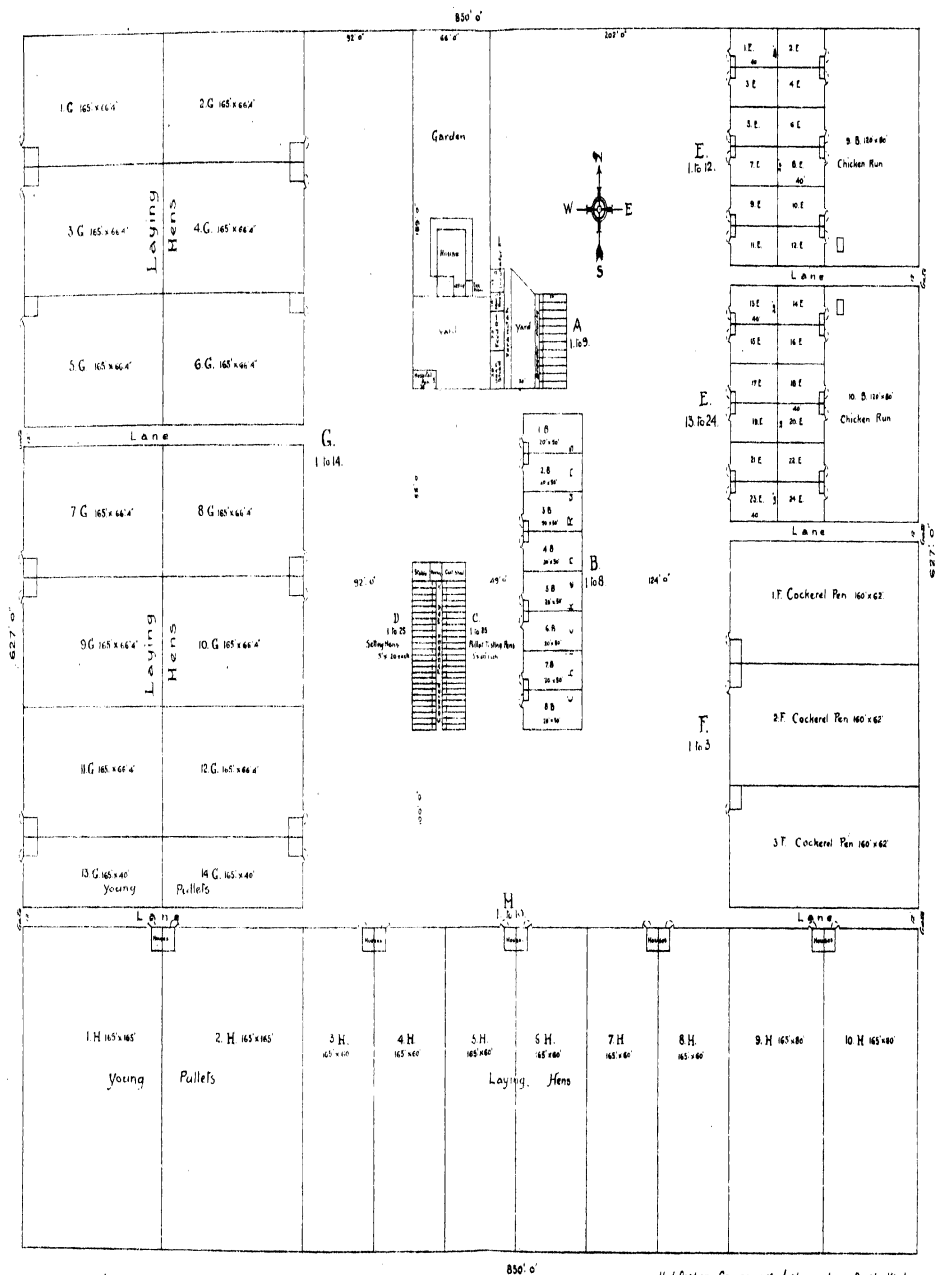
When commencing poultry-keeping, with the ultimate intention of conducting operations on a large scale, it is advisable to first make a sketch so that the runs can be laid out in as convenient a manner as possible in order to have access to any particular run without having to walk over a greater area of ground than is necessary. Sketch No. 1 shows a poultry-farm covering an area of about 15 acres. No. 2 shows a detailed view of four runs of the breeding pens.

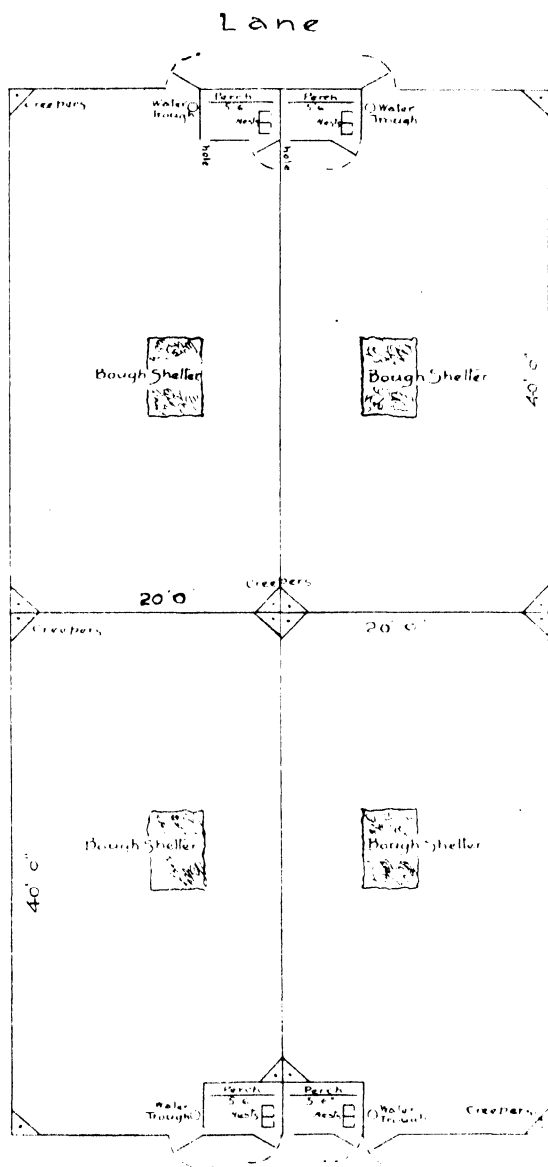
In laying out a poultry-farm, much depends on the natural conditions of soil, shelter, and lay of the land ; for preference, I like a sandy soil, with a slope to the East, and the whole area protected by growing trees on the South and West, which would act as a breakwind in cold weather.

The dwelling-house is enclosed in an area of $\frac{1}{4}$ acre, fenced off from the poultry-farm, and with a Northerly aspect. The egg-room and office are at the back in the coolest place facing the South, and protected by verandahs on East and West., access is obtainable to the office without having to go through the house. The incubator-room is placed as near the house as possible, and adjoining it are the man's room, feed store, and open shed. Here a great deal of the work is carried on, and it is necessary that they should all be in a central position. In following the plan it will be noticed that each set of runs is known by a letter and then numbered, identification of each portion of the plant being thus simplified. From the incubator-room the chickens are transferred to the brooder house A, which contains nine brooders with small runs attached. From thence the chickens are transferred to the runs marked B, each 20 x 50, which can be fitted with cold brooders as required. In addition to artificial incubation, provision is made for setting hens at D ; this is a long shed with 25 small pens, each 3ft. x 20ft., in which broodies are set, and are free from all disturbance ; the other side of the shed, marked C, is for testing single pullets for egg-laying qualities, in preference to the trap-nest system. The pens marked D would also be of use as cock pens when the breeding season is over. Runs B 9 and 10, each 80 x 120, are for well-grown chickens; three cockerel pens F could also be used for chickens, and as the sexes require separating the pullets are taken away and placed in the four pens marked G 13 and 14 and H 1 and 2. There are 20 runs for laying hens, viz., G 1 to 14, and H 3 to 10, each about $\frac{1}{4}$ acre, for 50 birds, making accommodation for 1,000 laying hens. There are 24 breeding pens, E, each 20 x 40, and are a convenient distance from the feed-house. The stable, harness-room and cart-shed are conveniently located. The hospital-pen is in the private yard where it is completely cut off from all other fowls. All runs are well cut up by 12ft. lanes, which can be closed at each end with gates or removable frames to facilitate the catching of fowls which get out

No 1.

PLAN OF A POULTRY FARM





Lane

Plan No. 2.

of their runs. There is plenty of open space available for rearing chickens in movable coops, if required.

All fowl-houses are placed on the boundary of each run, and open to the East. No. 2 plan illustrates, as an example, a nest of four of the breeding pens. The houses are built on the double principle, and the runs back to back; this system facilitates feeding, as it enables the attendant to throw hard feed into six pens, although only entering one of them. Each pen would have to be entered for mash feeding, which I prefer to place on small sheets of corrugated iron, but they should not be walked over and thus flattened out. The drinking vessels are kept just inside the gate, and for this purpose glazed earthenware troughs are preferred, covered by butter boxes to protect them from the sun. All houses are wire-netted in front, fowls gaining access by means of a small hole, which can be blocked up when catching birds, entrance for the attendant being obtained by a front door made from one sheet of iron. The nest boxes are kept just inside the door, they are in a secluded spot and easily reached when collecting the eggs. Fowl-houses placed on the front boundary have several advantages over those placed further back, especially those facing the lanes, as stock is easily counted and inspected at night time; they are handy for cleaning out, and the house can be utilised for fowls running loose, or as a cock pen, or for hens with young chickens while the run is being spelled. Fowls of the lighter varieties are likely to get on the roof of such a fowl-house, and then out of their run; to prevent this it will be necessary to run a strip of wire netting all round the roof of the house.

If the pens are deficient in natural shelter, small bough sheds should be erected, and where required, creepers make good protection; the back corners of the runs offer a good spot for planting creepers. *Dolichos*, or *Convolvulus*, are about the quickest growing creepers, but they do not grow well in cold, exposed localities. The *Kennedya* is also a good creeper, but requires an extra strong fence, as it is very heavy. If trees are to be planted, fig trees are one of the most suitable, as they grow quickly if given plenty of manure, provide good fruit, also splendid shade in hot weather, but bare in winter when shade is not wanted. Jarrah posts, 3in. x 2in., are best for the runs, but in localities where straight-growing timber is available the cost is much less; the part in the ground should be charred, paying particular attention to the ground level; thus if posts are sunk 2ft. they should be charred for 2ft. 3in., at least. Two-inch 6 feet wire-netting is suitable, but to prevent cocks fighting run a 2-foot strip of netting along each division, nailing it to the posts on the opposite side to which the main netting is fastened. Netting should be put up without any buckling; this can be done by making the netting fast at the bottom by nailing on to a partially-sunken batten or laced on to a strained wire sunk 2 or 3 inches into the ground, and then stretched upwards. But this is rather a slow method if a large area of land is to be enclosed; a quicker plan is to stretch the wire lengthways and make one end fast; to the other end interlace an iron bar, and by means of block and tackle strain the netting. I like the posts 7 feet above the ground with a strained wire on top running the whole length of the pens, there is thus a spare foot from the top of the netting to the strained wire. The netting is tied, say every five feet, to the top wire to keep it tight.

Corrugated galvanised iron is the best material for making the houses, it is expensive, but second-hand iron is frequently obtainable at lower prices.

The slope of the roof would be according to the lay of the land, and set so as to prevent rainwater running into the fowl-houses. Water would have to be laid on and taps provided at convenient spots.

POULTRY MANURE.

Poultry manure is a valuable fertiliser which is too often wasted. Some poultry raisers are, however, fully alive to its value, and carefully conserve it. As an instance I can mention Mr. S. Craig, of Belmont, who runs a large poultry farm and market garden, reference to which was made in Poultry Notes last month.

Mr. Thos. Hayward, of Bunbury, sends us an article from *The Field* dealing with the subject, and in his covering letter says:—"The average farmer does not place much value on this manure, nor take much trouble to conserve it. I find it a valuable manure in a vegetable garden. I have an enclosed fowl-house, with a good floor. I clean it out at least once a week, then cover the floor about 1½-inch thick with ashes from wood and Collie coal, often quite hot. I find this keeps the house perfectly free from insects, and the mixture of ashes, with the droppings from the fowls, gives splendid results in the garden."

The Field discusses the question in the following manner:—"As regards farmyard manures, or dung, it may be said that little light has hitherto been thrown on the value of the manure of poultry, although opinions have been freely expressed in this connection, while information as to the analysis of certain poultry manures is contained in a few agricultural handbooks. An article in the *Journal* of the Board of Agriculture for March, written by Messrs. E. and W. Brown, is of considerable interest to all who keep poultry, in that it deals with a series of observations which have been made during the past twelve months at the Reading College Poultry Farm. The article is perhaps doubly interesting as indicating a source of profit from poultry keeping, which is no doubt generally ignored by those who believe poultry keeping does not pay, as well as by those who keep poultry for profit. In the first case referred to four average birds from the ordinary stock were caged for a week's trial as to the quantity of manure produced. The birds were a Wyandotte cock, a Faverolles hen, a growing chicken, and a fattening bird, the three former being taken off the grass and the last from the fattening cages. Feeding was the same as under ordinary conditions, but the birds could, of course, not obtain natural food, although plenty of green food was given. Both the birds and the manure produced were weighed, and from these data the number of birds which would produce 1 ton of manure in a year was arrived at. Thus it was shown that twenty-four birds like the cock (weight 6lb. 12oz.; age sixteen months) would produce a ton of moist manure in a year, or fifty-nine would produce a ton of dry matter. Other figures are given in relation to the remaining three birds, and it appears that the farmer who keeps 100 hens and six cocks might expect four tons of fresh manure from them in twelve months. Presumably the amount, as well as the quality, would largely depend on feeding. In the case of fattening fowls the manure, as might be expected, is much larger in quantity and of better quality than that of the other birds. For example, the cock produced manure equal to nearly 27 per cent. of the body weight, while the fattening bird pro-

duced upward of 52 per cent. A large Aylesbury duck, a cross-bred goose, and a bronze turkey cock were also tested, and it is shown from the results obtained (1) that six and a-half ducks or four geese or ten and a-half turkeys would respectively produce 1 ton of their fresh manure annually, and (2) that twenty-nine ducks or twenty-four geese or forty-two turkeys would respectively produce a ton of dry matter.

Following the account of these tests, a very complete table of analyses of all classes of poultry manures is given; but it is to be borne in mind that they are analyses of samples of manure taken from ordinary birds, and not those caged for the test. The analysis of ordinary fowl manure (fresh) is given as: Moisture, 59.5 per cent.; nitrogen, 1.75 per cent.; phosphoric acid, 1 per cent.; and potash, 0.54 per cent. In McConnell's *Agricultural Note Book* we find fresh hen manure thus: Water, 56 per cent.; nitrogen, 1.63 per cent.; phosphoric anhydride, 1.54 per cent.; and potash, 0.85 per cent. The reader may make further comparisons for himself. When we come to the question of the valuation of the manures it is doubtful if the values employed in the estimates are justifiable, although later in the article the prices stated to be paid for air-dried manure in the fattening districts of the south of England correspond closely with the estimated value of ordinary dry fowl manure given in the table. The prices paid in the fattening districts for air-dried manure vary from £2 10s. to £3 per ton, compared with nearly £3 for air-dried manure of fowls at liberty, or about £4 12s. for that of fattening fowls, as given in the table of estimated values. The actual prices realised are thus not equal to the estimated values, since £2 10s. to £3 in the fattening districts is not the same as the price (£4 12s.) given in the table. As the article well remarks, however, the question needs further investigation; but the estimated values given will serve to indicate that poultry manure has a considerable money value. Taking nitrogen, phosphoric acid, and potash at 12s., 3s., and 4s. per unit (1 per cent. per ton) respectively, fresh manures are valued as follows:—Fowls at liberty, £1 6s. 2d. per ton; duck manure, 19s. 5d. per ton; goose manure, only 8s. 4d. per ton; and turkey manure, 16s. 2d. per ton. In the case of air-dried manures, on the other hand, the prices of the same classes would be £2 19s. 8d., £3 18s. 8d., £2 3s. 8d., and £2 18s. 5d. per ton respectively.

Various points of interest may be summarised thus: Duck manure contains a large amount of phosphoric acid; in the case of breeding and laying birds the average manurial value per fowl is estimated at 1s. 1d. per annum; assuming the life of such fowl to be two and a-half years, the manurial return in that time would be about 2s. 4½d. As regards ducks, geese, and turkeys, the manurial value per head of adult stock is estimated at 3s., 2s., and 1s. 6d. per annum respectively, while as forty fowls may be safely kept on 1 acre of land the manurial return would more than pay the rent! On the whole the article clearly shows, even if the values given are over-estimated, that poultry manure is of considerable worth, and all interested will do well to take advantage of the information given.

THIRD EGG-LAYING COMPETITION AT SUBIACO.

[Commenced July 1, 1908. To close March 31, 1909.]

Appended, herewith, are the results for the first month's laying at the new competition which commenced on the 1st July and is to run for nine months, terminating on the 31st March, 1909.

Eggs for sitting from any of the pens are obtainable on application to the Manager at Subiaco; prices range from 10s. 6d. to 21s. per dozen. A price list is forwarded on application, or see the *Journal* for July.

The following are the results up to July 31 :—

The figures in black indicate the winner of the monthly prize.

The first column of figures indicates the present position of the pens in the competition.

Pens marked thus, *, remained in from last competition.

FOWLS.

Six pullets and one male bird in each pen.

Owner and Breed.		July.
1	Mrs. A. S. Craig, Black Orpington	131
2	J. W. Buttsworth, White Leghorn	113
3	Sunnyhurst (S.A.), White Leghorn	109
4	Mrs. L. Mellen, White Leghorn	106
5	Greenville Poultry Farm, Silver Wyandotte	105
6	Mrs. C. F. Schmidt, White Leghorn	104
7	Lionhurst Poultry Farm, Buff Leghorn	104
8	Gaffney & Bach, White Leghorn	102
9	Greenville Poultry Farm, White Leghorn	97
10	Paddy King & Salter, White Leghorn	95
11	C. B. Bertelsmier (S.A.), White Leghorn	94
12	Bon Accord Poultry Yard, White Leghorn	94
13	Glendonald Poultry Yard, Silver Wyandotte	92
14	Mrs. Kynaston, White Leghorn	91
15	W. Elliot, White Leghorn	89
16	Mrs. Hobley, White Leghorn	87
17	C. Herbert, White Leghorn	86
18	R. G. Flynn, White Leghorn	86
19	J. Gaffney, White Leghorn	83
20	Shamrock Poultry Farm, White Leghorn	82
21	Mrs. A. E. Kinnear (S.A.), White Leghorn	82
22	S. Craig, White Leghorn	81
23	Homebush Farm, White Leghorn	80
24	Mrs. Flynn, White Leghorn	78
25	A. M. Thomas, White Leghorn	77
26	T. W. Martin, White Leghorn	76
27	Ontario (S.A.) White Leghorn	72
28	*White Wings P.F. (No. 2), White Leghorn	71
29	E. Garbett, White Leghorn	71
30	A. H. Padman (S.A.), White Leghorn	71
31	Craig Bros., Black Orpington	70
32	*J. Stuart, Golden Wyandotte	69
33	Honner and Forbes, R.C. White Leghorn	69
34	Coolgardie Poultry Farm, White Leghorn	66
35	G. George, White Leghorn	66
36	T. Ookerby, White Leghorn	62
37	*Adelaide Poultry Yard, R.C. Brown Leghorn	62
38	*T. W. Martin (late O. James), White Leghorn	62
39	South Perth Poultry Farm, R.C. White Leghorn	61
40	J. DeB. Morrison, White Leghorn	61

EGG-LAYING COMPETITION—*continued.*FOWLS—*continued.*

Owner and Breed.						July.
41	R. L. Martin, Black Orpington	...	...	...	...	59
42	Devine & Migro, White Leghorn	...	...	...	...	58
43	Mrs. Hughes, White Leghorn	...	...	...	...	57
44	*J. Stuart, S.L. Wyandotte	...	...	...	...	57
45	Craig Bros., White Orpington	...	...	...	...	57
46	F. Whitfield, Minorca	...	...	...	...	57
47	White Wings Poultry Farm (No. 1), White Leghorn	...	...	...	...	52
48	The Elms Poultry Yard, White Leghorn	...	...	...	...	51
49	Hillview Poultry Farm, White Leghorn...	...	...	...	...	51
50	Craig Bros. (S.A.) (No. 2), White Leghorn	...	...	...	...	49
51	G. Bolger, White Leghorn...	...	...	...	...	49
52	Mrs. McGree (No. 1), White Wyandotte	...	...	...	...	49
53	*J. D. Wilson, Brown Leghorn	...	...	...	...	42
54	Mrs. Younger, White Leghorn	...	...	...	...	41
55	*Mrs. McGree (No. 2), White Wyandotte	...	...	...	...	40
56	A. E. Champness, White Leghorn	...	...	...	...	40
57	O.K. Poultry Yards, White Leghorn	...	...	...	...	34
58	*J. Miller (late Dobson), Silver Wyandotte	...	...	...	...	34
59	J. Stuart, Silver-pencilled Wyandotte	...	...	...	...	33
60	Adelaide Poultry Farm, Buff Leghorn	...	...	...	...	33
61	*Mrs. H. M. Kelley, Gold Wyandotte	...	...	...	...	33
62	*Craig Bros. (No. 1), White Leghorn	...	...	...	...	30
63	*Mrs. H. M. Kelley, White Leghorn	...	...	...	...	23
64	T. Hickey, White Leghorn	...	...	...	...	0

Winner of first monthly prize, Mrs. A. S. Craig, Black Orpingtons, 131 eggs.

DUCKS.

Six ducks and one drake in each pen.

Owner and breed.						July.
1	H. Carr and Son, Indian Runner	...	...	...	...	142
2	Mrs. R. B. Moyle, Indian Runner...	...	...	...	...	132
3	*G. Thomson, Indian Runner	...	...	...	...	131
4	*Mrs. L. Mellen, Indian Runner	...	...	...	...	131
5	D. F. Vincent, Indian Runner	...	...	...	...	119
6	*Smith & Davenport, Indian Runner	...	...	...	...	116
7	J. Moyle, Indian Runner	...	...	...	...	114
8	White Wings Poultry Farm, Buff	...	...	...	...	114
9	F. Whitfield, Indian Runner	...	...	...	...	106
10	C. Phillips, Indian Runner...	...	...	...	...	101
11	C. Geddes, Indian Runner	...	...	...	...	89
12	*F. Whitfield (late Dusting), Indian Runner	...	...	...	...	72
13	Greenville Poultry Farm, Indian Runner	...	...	...	...	68
14	Bon Accord Poultry Yard, Buff	...	...	...	...	54
15	Adelaide Poultry Yard, Indian Runner	...	...	...	...	49
16	J. Robertson, Indian Runner	...	...	...	...	32
17	C. W. Johnston, Indian Runner	...	...	...	...	24
18	A. W. Edgar, Indian Runner	...	...	...	...	12
19	*South Perth Poultry Farm (No. 2), Pekin	...	...	...	...	7
20	Simplex Incubator Factory, White Indian Runner	...	...	...	...	4
21	Coolgardie Poultry Farm, Pekin	...	...	...	...	0
22	South Perth Poultry Farm (No. 1), Pekin	...	...	...	...	0
Total						1,617

Winner of first monthly prize, H. Carr and Son, Indian Runners, 142 eggs.

EGG-LAYING COMPETITION—*continued.*

SECOND YEAR'S TEST—FOWLS.

Owner and Breed.				July.	Total.
1	J. Stuart, Golden Wyandotte	...	...	69	1,469
2	Craig Bros.' No. 1, White Leghorn	...	...	30	1,325
3	Mrs. McGree, No. 1, White Wyandotte	...	...	49	1,237
4	J. D. Wilson, Brown Leghorn	...	...	42	1,167
5	Mrs. Kelley, Golden Wyandotte	...	...	33	1,152
6	T. W. Martin (late James), White Leghorn	...	...	62	1,137
7	Adelaide Poultry Yard, R.C. Brown Leghorn	...	...	62	1,111
8	J. Miller (late Dobson), Silver Wyandotte	...	...	34	1,067
9	J. Stuart, Silver-pencilled Wyandotte	...	...	33	938
10	White Wings Poultry Yard No. 1, White Leghorn	...	...	52	947
11	Mrs. Kelley, White Leghorn...	...	...	23	833

SECOND YEAR'S TEST—DUCKS.

Owner and Breed.				First year.	July.	Total.
1	G. Thomson, Indian Runner	...	...	1,571	131	1,702
2	F. Whitfield (late Dusting), Indian Runner...	...	...	1,493	72	1,565
3	Smith and Davenport, Indian Runner...	...	...	1,333	116	1,449
4	Mrs. L. Mellen, Indian Runner	...	...	1,244	131	1,375
5	South Perth No. 2, Pekin	...	...	840	7	847

PIG KEEPING.

By P. J. GIBBONS, Stock Inspector.

That pig-keeping is one of the most profitable branches of the farming industry, when systematically carried on, has been so fully demonstrated by practical men of experience in many countries, that the agriculturists of Western Australia are not justified in giving such a small share of attention to it. However, our slowness in developing this valuable industry may not be seriously regretted if the delay leads to establishing the business upon a sure permanent foundation.

The recent outbreak of swine disease has clearly shown that permanent progress cannot be made without a thorough reform of our hitherto accepted methods, and it is highly important that in reconstructing our swine herds, and extending our pig breeding operations we should provide those safety conditions which practical experience has shown to be necessary.

That nothing pays better than pigs, provided you can guarantee absence from disease, is a generally accepted proposition, and how to attain this can only be compassed by practical experience. The chief points to be considered are the keeping of pigs in sanitary premises under conditions of comfort and cleanliness (they are cleanly animals when allowed to follow their natural inclinations), and to feed in order to produce rapid fattening and subsequent profit.

While pigs require a condensed food mixture of nutritious character for fattening purposes, they need at the same time all they can eat of vegetable

fodder, such as mangels, turnips, peas and greenstuff. A good fattening food is a mixture of scalded pollard, cracked barley and buttermilk.

Pigs should be fed regularly three times a day, and provided with a good supply of drinking water in which a little Condry's crystals have been added. Seventy to eighty pounds dressed is a nice weight for porkers, and from 130lbs. to 140lbs. for bacon pigs. Slaughterhouse offal, even when cooked, is not wholesome pig food, and on no account should pigs be given raw flesh to feed on. With regard to keeping pigs in good healthy condition, a little wood charcoal or sulphur should be occasionally mixed with their food. Spraying occasionally with a solution of phenyle is also recommended to keep the animals clear of vermin.

Remember that the hog is a machine to produce pounds of pork, or bacon, out of what he consumes in feed. Avoid in-breeding, it spells disaster. The sire should be changed every two or three years, and new blood introduced. Beware of draughts, they are dangerous; colds, pneumonia and other ailments of swine can be very often charged to this cause. One of the rules founded upon practical experience is that pigs must have plenty of ventilation, but it must be overhead and not by underneath draughts. The responsibility in connection with the mortality in conveying pigs from inland centres to the coast in unsuitable draughty sheep and cattle trucks is such that it has yet to be brought home to the Railway Department, and in any case steps should be taken to have all trucks disinfected after conveying pigs.

The influence of draughts upon the health of the pig is notable in the light of the commonly accepted impression as to the hardiness of that animal, the fact being that a draught is actually the prime promoter of colds which develop into pneumonia and eventually into what is commonly described as swine-fever which is simply pneumonia, or an aggravated ailment that always begins with pneumonia, and if pigs can be kept from catching cold there will be no pneumonia, and consequently no swine-fever.

This is a simple fact which was at the foundation of the whole of the trouble that beset Victoria in 1902 and 1903 over the swine-fever scare.

Improper treatment, dirty pig premises and draughts annihilated for a time the great pig industry of America, and it cost a big sum to get the industry back by doing away with those costly experiences. We, in Western Australia, have the benefit of learning that lesson for nothing, but so far we have taken no notice of it. The pigs, however, do take notice, for they die as a protest against the improper conditions and bad treatment. It must be self-evident to all pig-owners that it is better and easier to keep pigs healthy than it is to restore them to health after they have been attacked by disease. So to be profitable, pigs should be kept in thriving condition, health of the herd being essential to make the business of pig-keeping a success.

The healthy pig has always a good appetite, his food giving growth and gain to him. Swine receive less care usually, either in health or sickness, than any other animal. Sanitary conditions are therefore a great help and a strong support in preserving health; sunshine is a valuable disinfectant and should be made use of as much as possible.

Pigs, like all animals, are liable to many diseases, although many persons attribute every fatal disease in them to swine-fever, while pneumonia and a number of other diseases carry them off as quickly as swine-fever although they may not be so contagious or infectious. Pneumonia is usually very prevalent during the winter and autumn months when cold winds are most

frequent. Growing pigs are very subject to this complaint, the chief causes of which are sudden changes of temperature, exposure and draughts.

Like typhoid in the human race, swine-fever usually strikes at the healthiest and strongest animals in the herd, while the weak and weedy pigs are more subject to pneumonia.

All strange pigs purchased should be kept isolated for a time before being allowed to mix with the home herd. Pig-premises should be frequently disinfected with a liberal supply of lime, which should be spread over the yards and floors, the walls and fences of the piggery being well lime-washed inside with a solution of lime and phenyle. All dirt and litter should be cleaned up at least once a fortnight and burnt.

The best and most profitable porker is the progeny of the Large Black sow by Berkshire boar.

Tamworth and Large Black Berkshire Cross sows put to a Yorkshire boar produce an ideal bacon pig.

TREE PLANTING AND FOREST PRESERVATION.

ALFRED J. EWART, D.Sc., Ph.D., F.L.S., Government Botanist and Professor of Botany in the University of Melbourne.

In Mr. Reed's admirable article on this subject in the December number of the *Journal of Agriculture*, due stress is laid upon the importance of this question as a factor in the agricultural future of Victoria, and a list of the advantages to be derived from systematic tree planting and preservation is given. In addition to these advantages, however, two others are worthy of mention, especially as they rarely have their proper importance attached to them. They are the influence of trees in maintaining the fertility of the soil, and their anti-spasmodic action on rainfall.

The Influence of Trees in Maintaining the Fertility of the Soil.

This action is three-fold in character. The deeply penetrating roots which most trees form over a part at least of their root-system draw up water from the deeper layers of the soil, to which the roots of ordinary crops do not penetrate. This water contains all the mineral constituents of the plant's food in varying proportions, and these salts are very largely stored up in the leaves and bark as waste products after they have been utilised. In this way they ultimately reach the surface of the ground again, while the leaves, bark, and fallen dejecta of the tree slowly rot and add to the percentage of humus in the soil, so increasing its capacity for holding water.

Ordinary crops have comparatively shallow root-systems as compared with most trees. Thus the roots of barley and mustard usually penetrate to

a depth of one yard, while those of the perennial clover and wheat may extend to two yards below the surface, and those of the everlasting pea and lucerne may reach a depth of three yards. The roots of old, well-established deeply-rooting trees, on the other hand, may penetrate to a depth of 20 yards or more, although the greater part of the root-system will be at a considerably less depth. In addition, the root can draw water laterally or upwards from neighbouring moister regions of soil, and the finer the soil the greater the distance over which this action may extend.

In the case of soils with a friable, open surface, the whole of the rain drains into the soil, unless the rainfall is extremely heavy. Each shower of rain washes downwards a part of the soluble constituents of the soil held by surface absorption on the soil particles. These soluble materials, for the most part, are washed past the crop root-system, and join the ground water in the deeper layers of the soil, which, in the absence of trees, drains away to the rivers or to the subterranean water-systems. These, for the most part, pour into the sea the calcium, potassium, and magnesium nitrates, sulphates, and even traces of phosphates leached from the soil, together with various other mineral constituents not required for plant food.

The roots of trees catch these mineral constituents to a large extent, suck them in along with the water they absorb, and pass them up to the leaves. It is worthy of note that it is mainly the useful soluble salts which are absorbed with the water, whereas as soon as the plant is clogged with the useless salts further absorption of these is checked. In other words, the tree selects to a certain extent the salts it requires, and sends them up to its leaves, and these salts are precisely those which crops require. During its whole life the leaf of a tree contains a nearly constant amount of potassium, magnesium, nitrogen and phosphorus, while the calcium usually steadily increases. Although the percentage of the first four elements usually decreases somewhat before the leaf falls, which takes place ultimately whether the plant is deciduous or an evergreen, a relatively large amount remains in the ash of the fallen leaf. As these salts are set free by the decomposition of the leaf and other dejecta membra of the tree in the soil, the ash constituents partly reach superficial root-systems, partly deep root-systems, and partly are washed out of the soil. The amount of mineral manure circulated in this way by a tree during its average life-time is considerably greater than that retained by the tree in its wood, which in most cases contains a very low percentage of nutrient mineral substances if calcium is excluded.

It follows, therefore, that belts and clumps of timber on a farm help the farmer to retain on his own land the manure he puts into it, and so reduce the annual loss by drainage of the soluble constituents of the manures applied to the crops, which are usually only able to catch and absorb a small fraction of the essential elements supplied to them in the form of manure.

Belts of timber on the banks of streams are of the utmost importance, not merely in preventing the erosion of the banks, but also because their roots form a filter through which the drainage water from the soil must pass, and be in part deprived of its mineral matter. At the same time, the effect is to hold up the ground water on each side, and prevent over rapid and erosive drainage from the soil.

The branches and leaves of most trees contain from one to four parts of ash per 100 of dry weight, whereas the dry wood usually contains less than 1 per cent. of ash. Some idea of the relative proportions of the valuable ash

constituents can be obtained from the following comparative values per 100 parts of ash :—

			Wheat			Wheat		
			Straw.		Leaves.	Grain.		Potatoes.
Potash	..	..	10	..	20	..	30	.. 28
Lime	..	..	6	..	12	..	3	.. 2
Magnesia	..	..	1	..	6	..	11	.. 4
Sulphuric acid	..	..	2	..	4	..	1/5	.. 5
Phosphoric acid	..	..	5	..	9	..	48	.. 10

The nitrogen practically does not appear in the ash, but in ordinary decomposition in the soil it is slowly set free as nitric acid, which combines with the bases in the soil to form soluble nitrates.

The value of trees as humus-producers can hardly be over-exaggerated, for the benefits conferred upon soil by the presence of humus in it are many and various. It increases the water-holding capacity of the soil. Thus a soil containing a fair quantity of humus will hold from two to three times as much water available for the plant's use as a pure sand. The presence of humus, and in this respect the humus formed from the decaying leaves of trees is especially valuable, increases the chemical actions in the soil, and causes more of the insoluble constituents of the soil to be rendered soluble and available for mineral plant food. In addition to this, the humus itself has a special power of retaining these soluble constituents in such a manner that the loss by washing from the soil by rain is reduced to a minimum, while at the same time they can still be absorbed by the roots of the plant and handed over as they are required. Finally, humus lightens heavy soils and favours their aeration.

A simple experiment to show the beneficial action of humus upon the roots of plants is to place on a heavy soil or clay surface a layer of leaf mould or well-rotted manure an inch or two thick, and cover this with 3 or 4 inches of clay or clayey soil. Soaked seeds planted on the surface soon strike downwards, and if the plants are dug up and examined by the time the stems are half-a-foot to a foot high, it will be found that the greater part of the root-system has been developed in the layer of humus. This is especially well shown by the garden "*Nasturtium*," but also by cereals and other agricultural plants, although, when the plants are older the roots are forced to strike deeper in search of water.

In warm climates the decomposition of humus in the soil is rapid, and hence there is little danger in this State of any excessive accumulation of humus leading to souring of the soil. The latter can, in fact, always be overcome by drainage and liming, and such soils, when properly handled, often prove to be of great fertility. Forest fires, by burning the humus off the soil, do incalculable damage, which, under primitive ancestral conditions, appears to have been made good in the following way :—After a severe bush fire had burnt off the humus and left the naked inorganic soil more or less fully exposed, seeds of *Acacia* and other plants lying dormant in the soil, and thus brought near to the surface, germinated. *Acacias* and other leguminous plants, by the aid of their root-tubercles, are able to obtain nitrogen from the air, and so develop readily in inorganic soils in which humus is deficient or absent. It is only in humus or organic soils that supplies of nitrates are continually being formed, any slight production of nitrates in, or addition of nitrates to, an inorganic soil being soon washed out by the rain.

The *Acacias* and similar plants gradually add humus to the soil and enrich it, so that the original forest of *Eucalyptus* or other trees may slowly re-establish itself. Bush fires are not modern things, but were certainly frequent before the advent of civilised man in Australia, and were probably frequent before the appearance of aboriginal mankind. There can be little doubt that this cycle, taking a hundred or more years to complete, has been repeated countless times over widespread areas. In fact, we are probably correct in regarding the thick, fibrous, difficultly-inflammable bark developed on the bases of the main trunks of many of the larger *Eucalypti*, as well as the absence of branches for a considerable height above ground, as being, in part at least, adaptations by the plant to constantly-recurring plutonic conditions, and these adaptations enable such trees to survive the effects of the bush fire which roars its way underneath.

The danger of devastating forest fires is naturally greatest where a continuous area of forest exists, whereas, with belts and clump of timber this danger is more localized, and the agricultural value of the tree-planting better fulfilled, especially if the borders and fringes of the plantation contain such plants as *Acacias* or the tree lucerne, *Medicago arborea*, i.e., nitrogen-fixing plants of economic value.

The Influences of Forests on Rainfall.

A full account of the evidence on this point is given by Mr. Maiden in the September number of the *Agricultural Gazette of New South Wales*, the general conclusion of the meteorologists being that forests do not increase the general average rainfall, but do affect local rainfall. It must be remembered, however, that the rain-gauge, on which the meteorologist pins his faith, is a very crude instrument, and that it is utterly impossible to measure the rainfall accurately in a forest by means of it, wherever the rain-gauge may be placed. In fact, many of the comparative observations are about as valuable as it would be to attempt to detect a leak in the roof by placing a rain-gauge in the garden.

In any case it is not a question of the total rainfall, but of what becomes of the rain. If the rain runs off the surface, ten times the rainfall will not keep the ground as moist and fertile as when it soaks in. An excessive rainfall is as bad as a deficient one, and renders a climate equally unfitted for agriculture, as witness the west coasts of Tasmania, Ireland, and Scotland, where humus forming conditions prevail to excess. A dry climate can be improved by irrigation, but an excessively wet one cannot be appreciably ameliorated.

In an ordinary climate trees bring back the moisture and dissolved minerals from the deeper layers of the soil, and retain them largely in local circulation. The effects of the rain and the rain itself are made to last over a longer period, and the moisture conditions of the district made more equable, instead of torrential leaching and erosive rain, alternating with devastating droughts. A forest is a sponge, to suck up moisture when it rains, and give it out again slowly when dry, and in the term "forest" all permanently-wooded bush or scrub land is to be included.

INFERIOR BLUESTONE FOR PICKLING.

There is evidence before the Department that settlers are supplied with material for pickling wheat which is alleged to be bluestone of standard quality but which, on testing, is found not to be sulphate of copper at all. An instance of this kind has been brought under the notice of the Department where an unsuspecting farmer purchased from a storekeeper a quantity of what was represented to be sulphate of copper at fivepence per lb. Being doubtful of its character, the buyer forwarded a sample of the article to the Department, and it was submitted for analysis to Mr. E. A. Mann, the Government Analyst, who reported the result as under:—

“Ferrous sulphate, 89.05 per cent.; copper sulphate, 10.95 per cent. This is a very bad sample.”

In fact, the farmer was supplied with an iron sulphate instead of sulphate of copper which he required for the preservation of his seed wheat against smut; and not only was the material useless for the purpose, but the price paid for it was excessive. It is a most reprehensible thing to pass useless and often deleterious articles on agriculturists who trust to the *bona fides* of the merchant and storekeeper, for not only is serious loss inflicted on the individual grower of food-stuffs whose crop may fail in consequence, but an equally serious injury is caused to the State whose material progress so largely depends on the success of the agricultural interests and each individual engaged in them.

The case here referred to emphasises the necessity for all farmers to purchase from reliable firms and be satisfied by analysis that the materials they obtain are up to the official standard before using them.

MESSRS. SUTTON & CO.'S SEED FARM.

(MR. PERCY G. WICKEN'S REPORT.)

Mr. Percy G. Wicken, who is in charge of the Western Australian Court at the Franco-British Exhibition, London, reports to the Under Secretary that he visited the seed farm at Reading of the well-known seedsmen, Messrs. Sutton & Co., and gave special attention to potato and grass plants. Marram grass appeared well, but another of the same tribe, *Elymus arenarius*, or sea-lime grass, looked better, and he recommends the latter for trials in stopping sand-drifts. The *Elymus condensatus* was worthy of consideration.

Mr. Wicken enumerated such grasses as *Piptatherum multiflorus*, *Milium paradoxum*, *Festuca arundinacea*—a good variety of tall fescue—*Festuca gigantea*, *Spartina cynosuroides*, *Bromus canadensis*, out of several hundreds as worth continued trials here. Messrs. Sutton & Co. recommended the

Anthyllis vulneraria, a kidney vetch, as very suitable for our climate. Among other grasses noted by Mr. Wicken for favourable consideration were the *Galega officinalis*—goat's rue; *Trifolium medium*—a clover with very large flower; and *Trifolium pannonicum*—an immense clover suitable for our South-West districts.

In respect to potatoes, Mr. Wicken found that the Scotch seed were deemed the best, a point for the Department to bear in mind should orders for seed be sent to England. Messrs. Sutton & Co.'s expert recommended the "Sutton's Epicure," the best of their varieties, for extended trials here. This variety has been tried here by the Department, but further trials could be given with probably increased satisfaction.

Referring to the grasses mentioned above, Mr. Berthoud says the *Festuca arundinacea* has been tried successfully at Hamel, doing exceedingly well on damp lowland, and proves to be a very useful grass on wet land. The *Elymus* is good upon sandy coast land but was useless at Hamel. The *Galega officinalis* was tried several times without success, but it may thrive on limestone soils. *Galega persica* has given fair results at Hamel, whilst the *Trifolium pannonicum* was tested a few years ago but did not germinate well, only a few plants giving any promise.

At Mr. Berthoud's request an order has been forwarded to England by the Department for a variety of grass seeds, as well as a small lot of seed of "Sutton's Epicure" potato.

CORRESPONDENCE.

DESTRUCTION OF STANDING TIMBER.

"Ex-South African" writes to us as follows on the denudation of our forest lands:—

"I notice that you invite correspondence on subjects of general interest. As a new settler in this country, I wish to raise a note of warning on the wholesale destruction of forest trees in the process of clearing. For instance, the trees on hills, or ridges, should never be cut down, especially on the stony knolls where only jarrah or white gum will grow, as these are absolutely useless for pasturage. With the destruction of the trees which hold the soil together, these ridges will gradually become denuded of earth, until only bare rock remains, down which the rain will pour in torrents, instead of, as now, soaking into the ground. The result will be, as we see it in South Africa, every watercourse washed out into a "donga," with high banks, though perfectly dry except during rains. These "dongas" will widen and deepen every year, and instead of shallow creeks, easily fordable anywhere, you will have impassable ditches with precipitous banks. Again: some discrimination should be shown in deciding which trees to fell. Some should invariably be

left for shade, and some varieties will undoubtedly become more and more valuable, either as timber or products. Of these, there cannot be any doubt that in the near future a profitable use will be found for red gum and black-boy resin, as was the case with New Zealand kauri gum. Jam is now usually preserved, and this is as it should be. But the time will come when present settlers will regret the ruthless felling of jarrah and other trees. White gum and sheoak seem best out of the way. But above all leave trees on all your ridges."

SOUTH AFRICAN FODDER

The same correspondent expresses his opinion on imported fodder —

"In your last issue, I observe an article on imported South African fodder, in which it is erroneously stated that *Rinderpest*, or *Russian plague*, is a South African cattle disease. It is endemic only in Russia, from which country it has occasionally spread to other European countries, as was the case in England during the '60's. Introduced into North Africa, it spread rapidly throughout the whole continent, being communicated to, and carried by game during 1896-7. It died out as rapidly as it came, and there has not been a case known in 11 years. The one disease that might possibly be conveyed in fodder is East Coast fever, which is carried by certain species of tick. It originated in Rhodesia — being supposed to be a more virulent form of Texan fever — about five years ago, and has slowly but surely spread southwards through Northern Transvaal into Zululand and Natal. The Cape and Orange River Colonies are absolutely clear of it, and their borders consisting of wide rivers or inaccessible mountain ranges strictly guarded and all importation of cattle or Natal fodder prohibited. Even the passes through the Drakensburg Mountains are being blocked and rendered impassable, consequently Cape fodder is perfectly safe. Considering the number of Australians who have visited South Africa and resided therein the ignorance of that country and its natural divisions is simply astonishing.

MILK PASTEURISING

Mr. T. R. Orr, of Esperance, writes to ask

- (1) What is meant by pasteurising milk, and what degree of heat used?
- (2) What kind of thermometer is used to tell degrees of heat in milk, or water for pig scalding? Where to get it and probable cost?
- (3) We do not like milk or butter from scalded milk and we do not care to risk disease. So we want to know how to manage so that it will taste good and be safe to use.

To these queries Mr. J. A. Kinsella, Government Dairy Expert, replies:

- (1) "Pasteurization of milk" means heating to a given temperature and maintaining the temperature for a length of time. (a.) Heating alone is not pasteurising, but the term is often used when milk or cream is heated and immediately cooled. (b.) The effectiveness of pasteurization is in proportion to the



Fodder cabbage (French: *Chou Muehler*).



Mouse-proof Stack.
For description, see "Notes" in March *Journal*, page 171.

length of time the milk or cream is exposed to a given temperature. For example, it requires a temperature of 185 Fah. for five minutes to destroy the germ of tuberculosis. Heating to this temperature always imparts to the milk a cooked or boiled flavour. This latter may, however, be overcome and the end accomplished by heating to 158 Fah. and maintaining the temperature at that point for thirty minutes, and immediately cooling to 65 Fah. If this treatment of either milk or cream is carefully carried out the scalded flavour can be avoided, and all adult forms of pathogenic organisms—and practically all others—will be destroyed.

- (2.) The best style of thermometer for a dairy, or for farm use, is a dairy float thermometer (all glass) registering from 0 to 212 Fah. All dairy supply dealers stock them; retail cost, 2s. 6d. They can be had in Perth from Macfarlane & Co., or the wholesale chemists.
- (3.) Is dealt with in answer to No. 1.

RUST-PROOF WHEAT.

It is reported in the *Colonizer*, a London publication, that a summer wheat has been found in the Transvaal which is said to be absolutely rust-proof.

According to the accounts, a farmer named Fourie, resident twelve miles from Bethel, out of half a bag of wheat which he sowed experimentally, reaped sixteen bags of excellent wheat, which ran the gauntlet of the heaviest rainy season for many years without being affected by rust. Encouraged by his success, he sowed again, and will reap about 200 bags. Another Boer farmer, Mr. De Wet (not the famous general), bought 1½ bags of wheat from Mr. Fourie, but during the drought fully expected the crop to perish. He reports that now "the crop is as fine as any I have seen for a long time, and the ears are very fat." Lord Selbourne, the present High Commissioner, has betrayed keen interest in the matter, and been to Bethel to discuss the discovery with the farmers on the spot. Our informant adds that there is not the slightest doubt that every Transvaal farmer who can possibly procure seed, and has an atom of enterprise in his composition, will undertake the cultivation of the new wheat, and several are confident that in the next decade millions of bushels of wheat will be grown on the High Veldt. Hitherto the Western Transvaal has held the proud position of the premier wheat-producing portion of the Transvaal—in fact, one enthusiastic settler there is so optimistic that he says that, although 140,000,000lbs. of wheat are imported into the colony at present, it will not be long before the Transvaal will produce its own wheat. Many farmers have determined as soon as possible to cease cultivating mealies, and take to wheat.

FODDER CABBAGE.

(French: *Chou Moellier*.)

This is a species of fodder cabbage which requires **cultivation** in light clay or sandy-clay soil—preferably marl—well manured. **It does not grow well on granitic land with a shallow, cold, clay, such soil being poor in lime.** The plant is affected by cold winter weather and does not **thrive on land that holds stagnant water.** Phosphatic fertilisers mixed with **manure will give it vigorous growth.** The leaves are well developed, but not so **numerous as the 1,000-headed kale.** It is distinguished by a tall, thick stalk, **broad at the centre, which contains a nutritious pith.** Cattle feed on it readily.

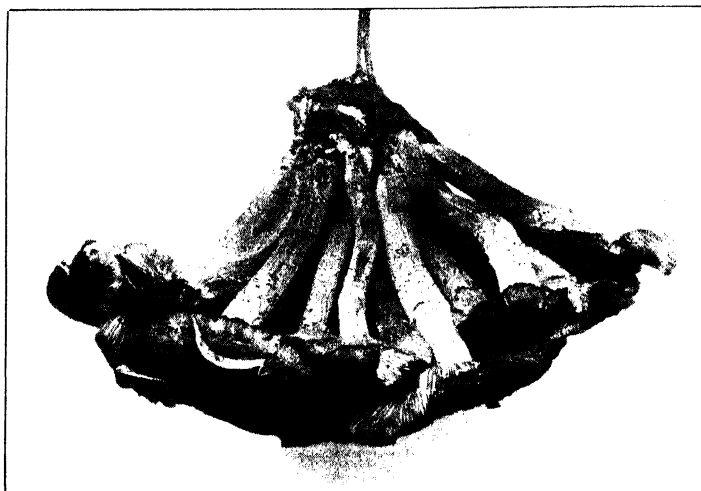
HOW TO CATCH WILD DOGS.

The following useful plan for catching worrying dogs and dingoes, by "Troglodyte" in the *Western Mail*, is worth reproduction:—

- (1.) Make a yard in the paddock near where the sheep have been killed.
- (2.) Muster the sheep clean every night into the yard and sleep in the yard with them, with a double-barrel gun handy.
- (3.) Be very careful to poison all meat left in the paddock by night. Any sheep killed and not broken can be carried away or put up in trees.
- (4.) Keep a good look-out in the paddock during day armed with a rifle, especially about three and four o'clock. Put several bells on sheep, so that if anything disturbs them they can be heard rushing. Try and get any neighbours that are affected to do the same.

If some of the sheep that are killed are partly eaten (which I take it is the case), the dog or dogs should be got in three or four days; but if they are killing for mischief only, which is sometimes the case, it will be far more difficult to get them. If the latter is the case, traps and spring-guns are the only chance that I know of. In either case the sheep must be mustered at night, or shifted eight or 10 miles away. It is of little use laying baits outside the paddocks while the dogs kill inside. It is far better to give all the attention to getting the dogs that come in, for they will not take baits as long as they can get at sheep.

When you have got the dogs that come in, and things have quietened down inside, then lay baits outside; but do not throw them down anywhere in the dirt, for the ants and cats and hawks, etc. Hang them on a piece of wire about 2ft. from the ground, and lay fresh ones every 10 days or fortnight. If you will carry out the above suggestions thoroughly I feel sure you will soon thin the dogs a good deal. Spasmodic efforts are of little use; what is necessary for dingoes is an unceasing war.



Fungus growth: *Armillaria mellea*.
(Side view showing stems; reduced size.)



Fungus growth on tree root (reduced size).

ROOT-ROT FUNGUS.*(Armillaria mellea.)*

— — —
L. J. NEWMAN, Assistant Entomologist.

On the 29th July I visited the Harvey and found the fungus sporing. Large clumps of toadstools were to be found wherever an infested root was within two or three inches of the surface, or had been cut through in the making of the drains. The illustration shows a clump of these toadstools, about eight inches high by 12 inches across, thus demonstrating the prolific growth made by this fungus, if neglected. This was pointed out to the growers, who were advised to destroy all such growths, as in this stage the fungus was spread by means of the spores which are blown about by the wind and where suitable conditions are found, start a fresh infection.

Good work is being done by the various owners and managers, which, with thorough tile drainage, prompt measures when the disease shows itself, and the clearing out of all roots, should eventually succeed in destroying the disease.

The recommendations contained in an article on this subject in last month's *Journal* will, if followed, assist in stamping out the pest.

CARRIAGE OF SECOND-HAND FRUIT CASES BY RAIL.

The Department has given some attention to the danger which exists in the carriage by rail of second-hand fruit cases from the Goldfields to the producing centres, where they carry infection and are factors in the propagation of disease. In order to put a stop to this practice the Commissioner of Railways has been asked, by direction of the Minister, to raise the freight on second-hand empty cases, and in that way provide an advantage for new ones in shooks. The Commissioner agreed to accept the suggestion and the following notification appeared in the *Government Gazette* of 14th inst., effecting an alteration in the Merchandise and Live Stock Rates Book, 1906, page 56:—

Empties.

Delete the words "*fruit cases*," in the seventh Clause under the above heading. Insert after the words "*Minimum charge 2d.*" the following:—

"Fruit cases (new) sent to be filled for conveyance by rail will be charged at the above rates. Empty fruit cases or packages that may reasonably be supposed to have contained fruit, will be charged double the above rates, whether sent to be filled or returned empty after conveyance by rail."

This regulation came into operation on 17th inst.

POTATOES GROWN AT HAMEL EXPERIMENTAL FARM.

Illustrations appear on the next page of samples of varieties of potatoes grown at the State Experimental Farm, Hamel, which were dug in the early part of the month. Mr. Berthoud, the manager, regards them as very fine specimens and of profit-making classes. This fact is borne out by the following particulars of each specimen shown in the picture:—

- No. 1. *The Factor*.—Natural size, 4in. by 2 $\frac{7}{8}$ in.; weight, 8 $\frac{3}{4}$ oz.
- No. 2. *Mr. Ambrose* (new). Natural size, 3 $\frac{9}{16}$ in. by 3in.; weight, 8 $\frac{3}{4}$ oz.
- No. 3. *Harmony*.—Natural size, 3 $\frac{1}{2}$ in. by 3 $\frac{9}{16}$ in.; weight, 10oz.
- No. 4. *Triumph* (early).—Natural size, 4in. by 3 $\frac{1}{4}$ in.; weight, 12oz.
- No. 5. *Rose of Erin*.—Natural size, 4 $\frac{1}{4}$ in. by 4in.; weight, 12 $\frac{3}{4}$ oz.
- No. 6. *Manistee* (new).—Natural size, 4in. by 3 $\frac{1}{2}$ in.; weight, 12oz.
- No. 7. *Taylor's Red*.—Natural size, 5 $\frac{1}{8}$ in. by 2 $\frac{1}{2}$ in.; weight, 8 $\frac{1}{4}$ oz.

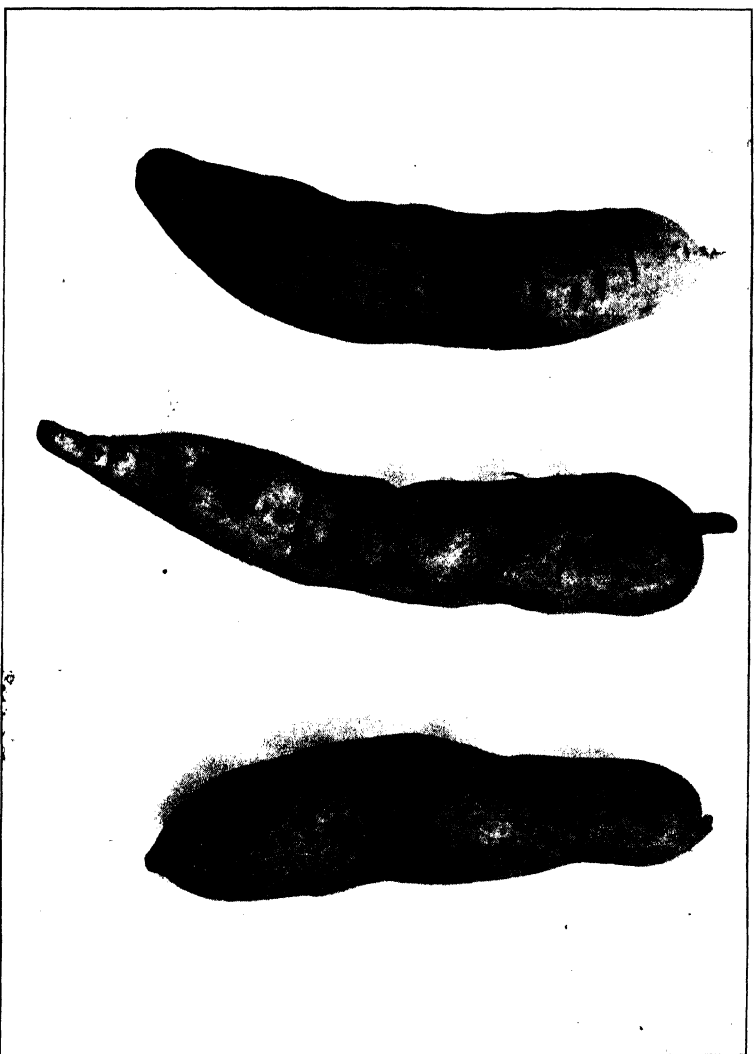
THE CULTIVATION AND TREATMENT OF ORANGE TREES.

A series of letters by "J. S." appeared in the *Bunbury Herald* dealing at length with the condition of the orange orchards in the Harvey district, and criticising past and present methods of cultivation. In July *Journal* we published an exhaustive paper on the fungus disease which has attacked the trees, including a valuable report by Dr. Williams on the trouble. Whilst recognising the value of Dr. Williams' contribution, "J. S." considers a "radical change" in existing methods of planting necessary to effect a complete remedy and prevent further contamination in present orchards. He attributes four causes for the appearance of the fungus, viz.: Bad clearing, bad planting, wrong stocks, and imperfect drainage.

In regard to the first, "J. S." points out how necessary it is to thoroughly trace all tree roots to a good depth and remove them, especially eucalyptus roots which sour the land; and, also, that trees should not be cleared before they have been ringbarked for a couple of years. Roots should be cleared to a depth of two feet, and not less than eighteen inches, and not one foot and as little as three inches as he states he found in some cases.

"J. S." condemned the system of planting followed in the district, where the local conditions require "different methods to those adopted in much drier countries like Mildura and California." He advises orchardists to properly prepare the ground, mound the land and raise the trees, which would banish the fungus and root rot difficulty.

Tree-raising should be done in early spring, and the trees ploughed up for a couple of seasons, leaving the collar well above ground so that top roots



Sweet Potatoes, "The Cluster," grown at Hannel State Farm.
(Left) Weigher, ribs; (center) Weigher, ribs; (Right) Weigher, ribs; (Right)

receive plenty of air and sunshine. The process of raising will facilitate removal of all roots besides improving the soil.

Referring to stocks, "J. S." thinks those obtained by Harvey growers were very inferior. He strongly advises great care in selection and recommends the bitter orange and wild orange of Florida as the best for wet districts, and from their hardy nature as more resistant of root rot and fungus diseases than the delicate lemon and citronelle stocks.

In districts with a heavy rainfall the question of drainage is a paramount one, and on this point "J. S." says particular care must be taken in order to allow surface water to run off quickly before it has time to sodden the ground.

AGRICULTURAL CONFERENCE.

A conference of delegates from Agricultural Societies and Associations has been convened by the Under Secretary, to be held on Wednesday, 26th instant, the Minister for Agriculture (Hon. Jas. Mitchell) presiding. Last year's conference was attended by so much success that the Department felt encouraged to call a second meeting this year. The leading subjects for discussion will be :—"The active settlement of our rural lands, and its recent fresh impetus. Fresh settlers in portions of the State which had hitherto not received attention whose acquired experience, if properly made public, will prove of great value to others on the land. The development of various industries for which respective districts are specially fitted and the benefit derived by the interchange of views from delegates in conference."

Free railway passes will be granted to the delegates appointed by the different societies.

Papers to be read will consist of:—

Farmers' Sheep, Management: W. H. Hancock.

Our Meat Supply, and its effect on Producer and Consumer: W. J. Butcher, M.L.A.

Wheat Breeding: G. Berthoud.

Dirt-bed Phosphates of W.A.: S. Goetzl.

Inspection of Stallions: R. G. Weir, M.R.C.V.S.

Cool Storage and its relation to Farming: A. D. Cairns.

Mule Breeding: A. Crawford.

Irrigation: A. H. Scott.

Fibre Crops: A. Despeissis, M.R.A.C.

Dairying: J. A. Kinsella.

Pig-raising on the Goldfields: G. S. Harvey.

Milling Characteristics of Wheat: E. A. Mann, Government Analyst.

RECIPES.

Dogs with Worms.—Once a week (fasting) give $1\frac{1}{2}$ grains of santonine, 1 grain of carbonate of iron, and 3 grains of jalap. Exercise until he gets an action.

Coughing in Young Cattle.—Coughing indicates disease affecting the respiratory tract. If caused by a bad cold, which is contagious among stock, give a mixture of equal parts of glycerine and chlorodyne, two tablespoonfuls to each in gruel, morning and evening.

Horses with Itchy Skin.—Half-ounce each of sulphate of zinc and sugar of lead mixed in one quart of cold water, and a little applied to the affected part. Spousing with loz. of carbonate of soda dissolved in one quart of buttermilk, or washing with two tablespoonfuls of Jeyes' Fluid, phenyle, or izal, mixed with one quart of cold water, is found very beneficial.

THE AGRICULTURAL BANK.

A few data illustrating the progress made by the Agricultural Bank will carry conviction with them that the institution is successfully accomplishing the national purpose for which it was created by the State. It will be seen that the Bank has already fulfilled a most important part in aiding the development of the primary industries of this young country, and that its area of operations is extending with the State's advancement and will assume large proportions in the near future.

Since the bank was established in 1895, over 5,400 settlers have been assisted under its provisions. Of these over 400 have repaid the advances made and now enjoy their freeholds unencumbered; others are passing through the easy stages of redemption, freeing themselves yearly in the gradual manner laid down in the statutes. Up to the end of last June, over 417,000 acres had been cleared under the bank's clauses, for which work the sum of £680,958 had been advanced to farmers. During last year alone, 141,061 acres were cleared, for which the bank advanced £168,487. This has been the means of bringing nearly 150,000 acres under the plough in one year, or one-third of the total area cleared under the Act, during its 13 years of existence. In other directions the same gratifying progress is being made. The total area ringbarked amounts to 533,400 acres, and during the past year 253,157 acres, or nearly half the total, were so dealt with. The fencing erected for the year ending June 30, 1907, presents a still more striking instance of the activity of local development. The total number of chains of fencing so erected amounts to 485,560, of which 322,963 were put up last year, or twice as much as was carried out for the previous 12 years. Up to June last, the amount advanced to settlers reached the sum of £1,059,659, and further advances have been authorised to the amount of £309,355.

The scope of the bank's utility has been widened by the present Government, especially in the direction of assisting the farmer to stock his land. During the past two years, the sums of £30,490, £5,641, and £39,588 respectively have been advanced for the purchase of horses, cows, and ewes.

It is proposed to extend the limit of advance to the individual to £1,000, instead of £500, and it is probable Parliament will consider this question during next session. In addition to the above, £100 may be advanced to the settler for the purchase of breeding stock. It is a significant commentary upon the success of West Australian farming that the Bank, with such a liberal loaning system, business ramifications, and necessarily limited outside inspection, has been conducted with only one trifling loss of a few pounds.

NEW BUTTER FACTORY AT BUNBURY.

Evidence of the growing development of the dairying industry was afforded at Bunbury on the 7th instant, when the formal opening took place of the new butter factory erected at that flourishing agricultural centre by the Bunbury Co-operative Dairy Company. There was a representative gathering on the occasion, including the Minister for Agriculture (Hon. Jas. Mitchell), the Under Secretary of the Department (Mr. A. Despeissis), and the Government Dairy Expert (Mr. J. A. Kinsella), the Secretary of the Royal Agricultural Society (Mr. T. R. Lowe), and also Mr. J. C. Alexander, of Messrs. C. A. MacDonald & Co., who supplied the factory plant. The establishment is claimed to be the first of its kind in this State.

In the course of the proceedings, when responding to the toast of "The Ministry," Mr. Mitchell said the Government had helped to establish the factory, and they had now to do something to make it a success. Western Australia was in a different position now to what it was two years ago. People realised that what they formerly considered a wilderness was of immense value. They had contended against disadvantages, and would have to face others. The Government had set aside £1,000,000 in the last two years for helping the settler. He pointed out that £1,000 per day was being sent out of the country for butter, and about double that amount for adjuncts to the dairy. They looked to this part of the country to bring about a change. They had established a dairy farm at Brunswick, and if they would only visit it they would admit that the Government had done something. They had brought over Mr. Kinsella, who he believed was much appreciated in the district, and if they listened to him he was sure he would advise them aright. He (the Minister) had imported 500 cows, for which action he had been adversely criticised, but now people were writing asking for more. It only took 600 cows to maintain a supply of a ton of butter per week and he was prepared to supply 1,000 cows on the same easy terms as were offered previously to promote the industry. This factory was only the forerunner of many others, and was being watched with interest. He congratulated the directors on their enterprise and the people of Bunbury on having the factory in their midst, and wished it all success.

ROYAL AGRICULTURAL SOCIETY

THE OCTOBER SHOW.

The following judges and stewards have been appointed to act at the forthcoming Royal Agricultural Show on October 20-24:—

Draughts: Mr. J. M'Burnie. *Stewards*:—Horses—Messrs. S. J. Chipper (ringmaster), W. S. Hales, Hubert Leake, Donald Paterson, V. H. Spencer, and A. E. Thomas.

Merino: (Fine), Mr. Ross Anderson; (strong), Mr. F. R. Walsh; Shropshire, Mr. A. W. Edgar; other British breeds, Mr. Major Gollan; fats, Mr. R. H. Holmes; wool, Mr. C. H. Fielding. *Stewards*:—Sheep—Messrs. H. J. Higham (chairman), W. C. Ball, G. J. Gooch, F. M. Knight, J. D. Paterson, F. A. Wedge.

Shorthorns and Beef Breeds: Mr. Isaac Wood; fats, Mr. Isaac Wood; Ayrshire, Mr. R. E. Weir; Jersey, Dexter, Holstein, Shorthorn (milking strain), Mr. A. Crawford.

Milk and Butter Competition: Mr. J. A. Kinsella.

Stewards:—Cattle—Messrs. C. W. Harper (chairman), M. Corbett and Donald McLarty.

Goats: Mr. A. Crawford.

Berkshire and Classes 16 and 17: Mr. G. W. Stubbs.

Large Blacks and Classes 13 and 14: Mr. G. M. Richardson. *Steward*, Mr. J. H. Fry.

Judging Competition: Merino ram, Mr. F. R. Walsh; draught mare, Mr. T. H. Wilding. *Steward*, judging competition, Mr. R. Carroll.

Sheep-dog Field Trial: Mr. E. F. Darlot. *Steward*, Mr. F. A. Wedge.

Apiculture: Mr. R. Wolfe.

Agricultural Produce: Mr. A. Gorrie.

Wheat and Flour: Mr. A. Gorrie and the Government Analyst.

Dairy Produce: Mr. J. H. Macfarlane.

Fruits: Mr. J. Hawter.

Vegetables: Mr. J. Tyler.

Floriculture: Messrs. J. Cramer, G. Schmidt, and S. J. Randell.

Industrial: Mr. R. Russell, c/o D. and J. Fowler.

Ale, Porter, etc.: Mr. W. Mumme.

Harness: Mr. E. R. Knoll.

Grasses: Mr. A. Despeissis.

Stewards in Exhibition Hall:—Messrs. John Duce (chairman), F. J. Hamilton, A. R. Bovell, F. H. Layton, G. G. Lavater, W. C. Brown, Harry Rose, and H. A. Devenish.

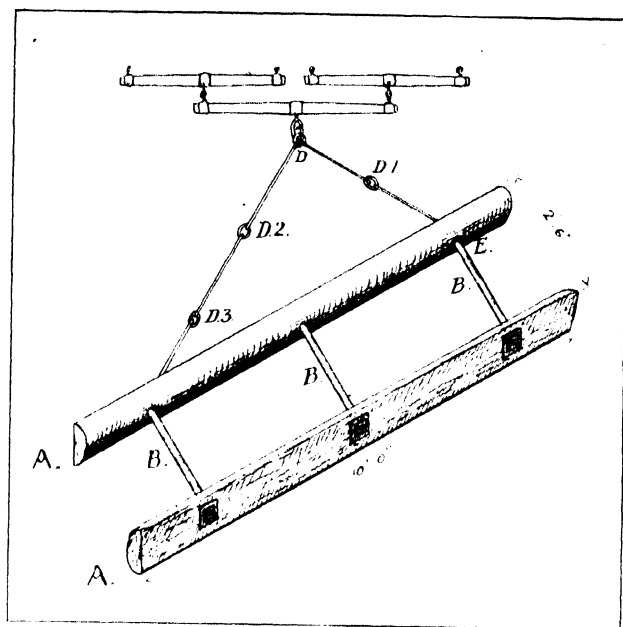


Fig. 1.

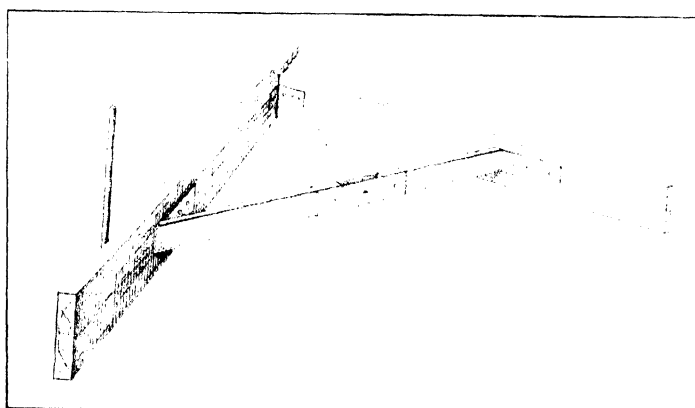


Fig. 2.

DEHORNING CALVES.

CAUSTIC POTASH TREATMENT.

Experiments recently concluded at the Nebraska Station show some interesting results in regard to the respective gains made by horned and dehorned steers. During a period of several months, and under varying weather conditions, the horned steers made a slightly larger gain, but the greater value of the dehorned steers as feeders still made them the most profitable. Furthermore, from the time they entered the feed lot until they were slaughtered the dehorned would continue to have the advantage. There would be less danger from injury during the feeding period and they would bring a higher price on the open market. Upon our larger markets dehorned steers will bring from 10 to 20 cents more per hundredweight than horned steers of the same quality, due largely to the fact that shippers do not care to bid upon the horned offerings.

Being convinced of the advantages of dehorning, the cattle raiser should then proceed to use the easiest and most humane method of performing this operation. Where the calves are raised on the farm the best method is by the use of caustic potash. While this treatment has been explained many times, it probably will bear repeating. To be sure of success it should be done before the calf has reached the age of ten weeks, and preferably at the age of four or six weeks. It is advisable to lay the calf down on its side, so that in its struggles no portion of the potash will get into its eyes. With a pair of shears clip the hair away from the region of the horn. After having wrapped paper around one end of the stick of potash, dip the exposed end in water and rub gently upon the extremity of the horn. The soft exterior of the horn will soon be penetrated, exposing a raw, red surface underneath. Still using the caustic pencil, keep pushing the outer coating back until the raw spot is about the size of a dime, which is sufficient in most cases. Care should be taken that no water drips off from the end of the caustic pencil, for if this gets upon the tender skin of the calf it makes an unnecessary sore. The operator should also observe caution and not get any potash on his skin or in his eyes. Caustic potash can be purchased at any drug store in sticks about the size of a lead pencil, and a dime's worth will easily dehorn from 20 to 30 calves. When not in use the potash should be kept in a bottle tightly corked, for if left exposed it absorbs moisture from the air and disintegrates rapidly.

— *Farm and Home.*

COUNTRY ROAD-MAKING.

Good roads in country districts are among the first essentials to the progress of settlement. Farmers never cease to think of their means of transit and Roads Boards are not allowed by them to become indifferent to their wants in that direction. To these local bodies who have, as a rule, to make a close study of economical expenditure, especially in sparsely populated localities, consideration is given to methods of construction which combine efficiency with the minimum of cost. It is of great importance to provide roads wherever needed by settlers and at the same time keep within the limit allowed by local revenue. Methods which offer simplicity, diminution of cost, permanence and quickness of construction without necessity for the use of much professional engineering skill, should readily appeal to country Roads Boards and settlers in W.A. as coming best within their scope of action.

To give point to this matter, we here summarise some very useful information contained in articles published in the Queensland "Agricultural Journal," which is supplied by Hon. A. J. Thynne, M.L.C., who demonstrates that unmacadamised country roads—or mere dirt roads—can be made permanently sound at little expense, on a plan devised by Mr. D. Ward King, an American farmer. This work can be effected by means of a log drag (Fig. 1), which is described as follows:—

In this diagram *a, a*, are the two halves of a split log, 9 feet long, 10 to 12 inches thick, set on edge, 30 inches apart, both flat sides to the front ; *b, b*, strong oak or hedge bars, the ends of which are wedged in 2-inch auger-holes, bored through the slabs ; dotted line, chains or strong wire. *D, D1*, are rings to connect double-tree clevis. Hitch at *D* and stand at *C*, on a plank laid on the cross-bars, for ordinary work ; or hitch at *D1* and stand at *E* for ditch-cleaning or to make the drag throw more dirt to the left. To move dirt to the right reverse position of driver and hitch. If working a clay or gumbo road, put iron, old wagon-tire, or something of the sort, on lower edge of drag at end of six months ; for softer soil at the end of twelve months.

Relating his first experiment, Mr. King said:—

The horses were attached at such a point of the wire as to give the drag a slant of about 45 degrees in the direction required to force the earth that it would gather from the side of the road up into the centre. We had just had a soaking rain, and the earth was in a plastic condition. I had driven this drag but a few rods when I was fully aware that it was serving at least the initial purpose for which it was intended—that of levelling down the wheel rut and pushing the surplus dirt into the centre of the road.

At my neighbour's gate, towards town, I turned round and took the other side of the road back to my home. The result was simply astonishing. More rain fell upon this road, but it "ran off like water from a duck's back." From that time forward, after every rain or wet spell, I dragged the half-mile of the road covered by my original experiment.

At the end of three months the road was better than when it had been dragged for three weeks, and at the end of three years it was immensely

improved over its condition at the end of the first year's work. I studied the results of each step in my experiment, and finally learned that three elements are required to make a perfect earth road, and that the lack of any one of them is fatal to the result. To be perfect an earth road must be at one and the same time oval, hard, and smooth. All of these indispensables are acquired by the use of the split log drag in any soil that I have ever come in contact with—and I have worked in the various kinds of clay soil in the gumbo of the swamp lowlands and in the black mud of the prairies.

Observation of my experiment taught me that two weeks of rain would not put this bit of road in bad condition at a time when the highway at either end of it was impassable for a wagon. Of course it was plain that the reason the road was not bad was that there was no mud in it. But why mud would not collect in it was not clear to me until I was taught my lesson by the very humble means of the hog wallow. One day I chanced to notice that water was standing in one of these wallows long after the ground all about it had become dry. Probably I had many times before observed this fact, but not until now had it occurred to me to inquire into its cause. Examining the edges of the wallow, I was impressed with the fact that it was almost as hard as a piece of earthenware. Clearly this was because the wallowing of the hogs had mixed or puddled the earth and the water together, forming a kind of cement, which dried into a hard and practically waterproof surface.

The next important lesson in my understanding of the real elements of road-making was taught me by studying what we farmers call a "spouty spot" in the side of a clay hill. All who live in a clay country know the unspeakable stickiness of one of these spouty places, and are familiar with the fact that, after ten days or two weeks of bright, hot sunshine, you can take an axe and break from one of these spots a clod so hard that with it you can almost drive a ten-penny nail into a pine plank. Naturally, it occurred to me that if this puddled clay soil would stay hard for three months when left in a rough condition, it would surely stay longer if moulded into the form of a smooth roof, so that the water which fell upon it would easily run off.

This original half-mile of road was dragged steadily for four years before I had a single active recruit in my new crusade. At first my neighbours poked good-natured fun at me, probably because the thing was so new and so absurdly simple—and, perhaps, also, because I did the work without pay or any expectation of it. Road-making in the country, it may be well to explain, is not generally followed as a fashionable philanthropy or a popular diversion.

From the outset of this work, so many questions have poured in upon me indicating points concerning which the public is prone to go astray in its understanding of how to build and use the split-log drag, that I have prepared the following road-dragging "catechism" as covering, with fair completeness, the main working facts in the problem :—

Would it not be better to plough the road before dragging? No. Ploughing gives a soft foundation. Ploughing the middle of the road is a relic of the old dump-scraper days.

What do you do when there are deep ruts in the road? Drag them. If you drag when the surface is quite loose and soft, you will be surprised how soon the ruts disappear.

How do you get the dirt to the middle of the road ? By hauling the drag slantwise with the end that is toward the centre of the road a little to the rear of the other end.

But suppose the road is too narrow ? First drag the wheel tracks. After three or four rains or wet spells, plough a shallow furrow just outside the dragged part. Spread this over the road with a drag. Only plough one furrow. You may plough another furrow after the next rain. At each ploughing you widen the road bed 2 feet.

How many horses do you use ? Two, generally ; three if it is just as handy ; four when breaking colts—a good solid team in the centre and a colt on each side ; two men on the drag—one to drive, the other to control the colts.

How do you drain the road ? If the earth is pushed in the middle of the road continually, the road will drain itself.

Why not make the drag out of plank ? You can, and do good work. But the split-log is best. The plank drag is not so stiff.

Why not make the drag out of heavy sawn timber ? Because drags so made have a tendency to slip over the bumps.

Don't you grade up the road first ? No. The grading is done with the drag gradually. By so doing, the road is solid all the time, and is built on a solid foundation.

What does it cost to drag a mile of road a year ? The cost is variously estimated at from one to three dollars.

How do you keep the drag from dodging around sidewise ? By not loading it too heavily. If a drag dodges around the earth you are moving, it is because it is overloaded.

Will the dragged road stand heavy hauling ? Yes and no. A dragged road will stand more heavy hauling than an undragged road, but not so much as a macadamised or well-kept gravel road.

Will a drag help a sand road ? A sand road is a very different proposition from the black soil, clay, or gumbo. An entirely different method must be adopted. Three things may be done to a sand road to make it better : First, keep it wet ; second, haul clay on to it ; third, sprinkle it with crude oil, as they do in California and in some parts of Southern Kansas and Texas. The drag will be beneficial in keeping the sand road perfectly flat, so that it will absorb moisture and retain it a long time.

To this catechism I would add the following "Don'ts" : Don't drive too fast. Don't walk ; get on the drag and ride. Don't be particular about material ; almost any log will do. Don't try to drag with only one piece ; use two.

A SOUTH AFRICAN IMPLEMENT.

Some time ago the Natal "Agricultural Journal" gave the following description of a plan for making good roads very cheaply, and with obvious simplicity, designed by Mr. M. Kelly, District Forest Officer, Maritzburg :—

The invention, or possibly unconscious adaptation of a snow-plough, or some kindred implement, will best be understood from examination of the accompanying Fig. 2. The simplicity is at once obvious. Two pieces of 3-inch by 12-inch timber, one 11 feet and the other 10 feet long, are joined

together at one end by a bolt hinge, and are kept apart at the other end by a spreader. At the nose of the implement the longer piece of wood is bevelled off sharp to the near side, and the shorter piece is similarly bevelled so that it may lie fairly close at the point of junction. That point is where the bevelling of the long piece begins, about 4 inches from its sharpened coulter-like edge. This forepart is protected by a shield of iron plate, and the draught is from the point of the main beam. The handle is a piece of piping. In going through gateways, and under other occasional circumstances, this handle is of service; when the implement, however, is at its work the haulage keeps it in its proper place and no guiding is necessary. The "road-maker" has been designed for the making of cheap roadways on the slopes of that portion of the Little Swartkop Mountain which comes within the Government Experimental Farm, slopes destined to be forest clad before long.

For scraping out roads to take wheeled traffic this implement, on a larger scale, of course, would be equally serviceable. The working is perfectly simple. Firstly, peg out the road, then plough two or three furrows; then push the sods aside with the road-maker, and so on until the desired breadth is attained. The construction of the "road-maker" is so simple that anyone having a small share of mechanical skill should be able to make one for himself. The only materials required are the wood, the bolts, and some old wagon wheel tire iron for the spreader and for the shoeing of the beams. The shoeing, however, would only be necessary if the amount of work to be done were considerable.

THE FARMERS' VETERINARY MEDICINE CHEST.

No well-regulated farm should be without a good stock of medicines and drugs for treating stock overtaken by ailments or accidents. The following comprises a suitable list for general use, which is recommended by the *Farmers' Advocate*:—

Epsom Salts, 10lbs.; gamboge, 1lb.; Barbadoes aloes, 1lb.; ginger, 1lb.; gentian, 1lb.; nux vomica, 1lb.; hyposulphite of soda, 1lb.; bicarbonate of soda, 1lb.; nitrate of potash, 1lb.; chlorate of potash, 1lb.; iodide of potash, 1lb.; cantharides, $\frac{1}{4}$ lb.; biniodide of mercury, $\frac{1}{4}$ lb.; sulphate of iron, 1lb.; calomel, 1lb.; vaseline, 4lb.; catechu, 1lb.; boric acid, 1lb.; prepared chalk, 1lb.; chloral hydrate, 1lb.; sulphate of zinc, 1lb.; acetate of lead, 1lb.

Liquids:—Raw linseed oil, 1 gal.; oil of turpentine, 1 quart; fluid extract of belladonna, Soz.; tincture of opium, Soz.; sweet spirits of nitre, Soz.; liquor ammonia, Soz.; liquor ammonia acetatis, 1lb.; carbolic acid, Soz.; creolin, zenoleum, or other coal tar products, 1lb.; rectified spirits, 2lbs.; tincture of arnica, 2lbs.; butter of antimony, 4oz.; tincture of myrrh, 4oz.

This will make a fairly complete list and includes most medicines that are reasonably safe for the unprofessional man to use. Some are used externally, and others internally.

BACON INDUSTRY IN IRELAND.

ROSCREA CO-OPERATIVE FACTORY.

Bacon-curing forms so important an industry in Ireland, and provides employment and profit to so large a proportion of the agricultural population of the country, that accounts of its developments and progress must prove both instructive and interesting to us in this distant portion of the Empire where the industry is only in its infant stages. We have received from Mr. Loudon M. Douglas, Lecturer, East of Scotland College of Agriculture, Edinburgh, an interesting description, accompanied with several views, of the Roscrea Bacon Factory, the first farmers' co-operative bacon factory in Ireland, the corner-stone of which was laid on April 29, 1907, by the Rev. John Cunningham, C.C., Roscrea. A few of the most striking illustrations are reproduced with this article.

HISTORY OF THE FACTORY.

The distinction of being the first farmers' co-operative bacon factory in the United Kingdom belongs to the town of Roscrea, in County Tipperary, Ireland.

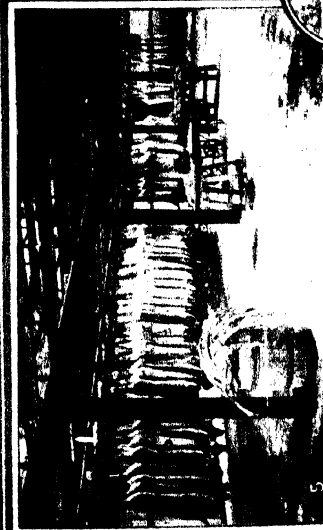
The town has a history which goes back to the beginning of the seventh century and at one time enjoyed much commercial prosperity, and it was also the seat of considerable ecclesiastical learning. At the present day the "remains of its castles and ecclesiastical edifices, which were extensive and stately structures, with its ancient round tower, convey an idea of its former importance and render it an interesting object as seen from the hills in the neighbourhood, which abounds with picturesque scenery." Roscrea is situated in a splendid position, and in the middle of a prosperous agricultural area, from whence some of the best pigs in Ireland have been drawn. This fact so impressed itself upon so many members of the Roscrea community some few years ago, that steps were taken to test the feeling of the agriculturists as to the prospects of combining so as to form a co-operative bacon factory in their midst. A work of this sort, however, is naturally somewhat difficult, inasmuch as no such undertaking had been realised in Ireland before, and as a consequence, there was nothing in the way of local data which could be referred to by way of comparison, and the only authoritative information which could be thus utilised was such as could be obtained from Denmark, where co-operative bacon curing has attained so signal a success, that, although only commenced in the year 1888 there are now in that small country some 33 farmers' co-operative bacon factories.

The district in which the supporters of the factory exist may be taken as the area within a radius of 18 miles round about Roscrea, including parts of King's County, Queen's County, Kilkenny, and County Tipperary, and the work of organisation in such a large area—considering that the means of transport are difficult—was a very heavy one, and all credit therefore, is due to Father Cunningham and those associated with him for the immense amount of hard work which they put in in season and out of season in order to bring



Roserea Bacon Factory.

1. General view of Exterior of Buildings.
2. Disembowelling Department.
3. Hanging under Singer ready for hoisting through fire.
4. In Hanging-house for splitting into sides.



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Rosevea Bacon Factory.
 5, In Hanging-house after branding sides. 6, Curing Cellar. 7, Lard-rendering Pans. 8, Sausage Room.

about a successful organisation. In this they were ably seconded by Mr. William Scully, and the usual method was to hold a meeting in a schoolroom or in the open air at some village and put forward the advantages of bacon-curing, after which a local committee would be formed, and the members of this committee would then accompany Mr. Scully from house to house so as to invite the residents to take up shares in the factory. In this way 26 parishes were organised, and each parish formed a unit from which ultimately 46 representatives were appointed, so as to form a General Committee. Thus, at the end of about two years from its inception, this General Committee met in Roserea and proceeded to formulate rules for the proper conduct of the business, in which they were assisted by Mr. R. A. Anderson of the I.A.O.S.

One of the first steps also was to see to the improvement of the breeds of pigs in the neighbourhood, and in this work the Department of Agriculture and Technical Education for Ireland came to the assistance of the committee with a grant of £100, and this sum, small as it is, has been judiciously expended in teaching farmers what kind of pigs are wanted for bacon-curing; and also in the supply of stud boars which have been placed at the service of local breeders. It must be borne in mind, however, that County Tipperary and the adjacent counties have long been celebrated as one of the best pig breeding districts in Ireland, and that the principal supplies from these areas have been sent to Limerick for many years. The characteristic of the bacon produced from these pigs is that it is firm in texture. Having formed a General Committee it was necessary then to appoint a Directorate, which would be responsible to the committee, and this was done, twelve gentlemen from each district having been duly elected. It may be well to state that the Directors retire in rotation, but are eligible for re-election. The General Committee and the shareholders thus have a complete control over the administration of the business.

Rules for Supply.

The Roserea Bacon Factory was inaugurated and has been carried on since its start as a Friendly Society, and is registered under the Friendly Societies' Acts. It is purely co-operative in principle, and each shareholder is entitled to share in the profits according to the number of pigs he supplies. A statutory rule exists that each member of the Society must, under a penalty of 10s. per pig, offer such bacon pigs as he produces and all of them to the factory. This ensures a constant supply of the raw material, and also prevents any attempts by outsiders to unduly influence the local markets temporarily, so as to induce pig-breeders to send their pigs elsewhere. On the other hand it is laid down that a bonus will be given to pig suppliers according to the number of pigs which they produce. The rules are very comprehensive in character, and are subscribed to in a declaration which each shareholder has to sign and which forms a definite and binding contract.

Share Capital.

The number of shareholders is about 2,800 and the capital aimed at is £15,000. It was not thought necessary to call up the whole of this sum to begin with, but the enormous success of the undertaking has made it necessary to revise this decision, and in consequence the Directors have decided to call up the whole of the capital so that the trading of the Society may be conducted on the best possible lines.

Buildings.

The bacon factory was designed and has been equipped throughout by Messrs. William Douglas & Sons, Limited, of Putney, London, who are well-known as having constructed all the bacon factories in the United Kingdom for many years. The building is situated on a plot of land adjacent to Roscrea railway station, and is constructed throughout of corrugated iron which forms the roof and sides and which is carried on vertical iron columns. The total area covered is approximately 136ft. x 120ft., and the departments are laid out in the following order :—1, Receiving Shed ; 2, Pig Sties ; 3, Catching Pen ; 4, Sticking Pen ; 5, Bleeding Passage ; 6, Scalding, Scuttling, Singeing and Disembowelling Tank ; 7, Hanging House ; 8, Gut House ; 9, Chill Room ; 10, Curing Cellar ; 11, Sausage Room ; 12, Lard Room ; 13, Packing House ; 14, Smoke Stoves ; 15, Engine and Power Room ; 16, Offices. It will thus be seen that the factory embraces all the various departments necessary in a modern building of the kind.

The capacity of the Bacon Factory is 750 pigs per week, and the total cost, including the land, was about £7,500.

Working Methods.

The pigs are first of all received at the receiving-shed, and the factory are prepared to pay for them there and then by live-weight. As a matter of fact all pigs are passed over a live-weight scale, but the farmer has the option of being paid either by live-weight or by dead-weight. The difference that is reckoned between live-weight and dead-weight is put down at one-third, so that if the factory pays 30s. per cwt. live-weight, this is equivalent to a difference of 10s. or 40s. dead-weight. The receiving-shed is so constructed that farmers' carts can be brought up close : and the pigs are able to walk straight on to the receiving platform and thus all accidents are avoided. After they are weighed alive the pigs are driven into the pig sties, which are 17 in number, and have an accommodation for about 200 pigs. Such a number of pigs may be received throughout the day, and they are allowed to rest until the following morning when they are slaughtered. The slaughtering always takes place in the morning.

When the real work in the factory begins, the pigs are driven in batches into the hoisting-pen, and are hoisted one by one. They are hoisted to the sticking-pen by means of a hand hoist and a shackling chain which is passed over one of the hind feet, and thus when in a vertical position the blood is let out ; the whole operation occupying a very short time—the average being about one minute between the time when the pigs are driven into the hoisting-pen and the time they are dead. As soon as the slaughtering has taken place, the carcasses are pushed along into the bleeding-passage, which is broad and roomy, and is capable of containing 50 or 60 pigs at one time. The walls of this Department are lined with glazed white tiles, so that any specks of offensive matter which might be left behind are easily distinguishable and can be washed off. When the carcasses are hung for some little time in the bleeding-passage, they are pushed along the hanging-bar, and are then thrown upon a dumping-table where the shackling chains are removed. They are then rolled into the scalding-tank where the hair is scalded off, and, as soon as this is accomplished are thrown upon a scuttling-table where the hair is cleaned from the carcasses. At this point it is necessary to determine whether the car-

cases have to be used for "Wiltshire bacon," or as "Scalders" from which the Irish bacon is prepared. If they are to be used for "Wiltshire bacon" the carcasses are passed through a singeing-furnace, which not only removes any hairs that may be left on, but hardens the skin, and imparts the peculiar flavour to the meat such as is usual in "Wiltshire bacon." The carcasses are then thrown into a cold water bath and immediately hoisted to the disembowelling-bars, where they are disembowelled, dressed, and cleansed by means of overhead sprays of water; the offal being carried to the adjacent gut-house.

Should the carcasses not require to be singed, they are passed along an independent bar clear of the singer, to the same disembowelling-bars, and are dressed in the same way. After disembowelling the carcasses are passed on to the dead-weight scale, where they are weighed and are then split down into sides and the backbones removed, and head and fore feet are severed and are allowed to hang by a small piece of skin. The flake lard is removed and, together with the backbone is thrown over the carcasses, the sides being kept together by a small piece of unsevered skin at the nape of the neck. After dressing they are pushed on to the hanging-house where they are hung for a number of hours so that the excess of animal heat may dissipate. When this has been accomplished, the sides are entirely severed, and the various offal separated and handled in different departments. Thus the lard is taken to the lard-room; the head and feet are forthwith placed in pickle to be cured; the backbones are sent away fresh.

Curing.

The dressing of a side of bacon is a process which requires some considerable experience, and it would take some time to describe. It will be sufficient, therefore, for our purpose here to say that, the sides after being properly trimmed and dressed are hung in the chill-room, which is held at a temperature of 38 degs. Fahr. and in which a constant current of cold dry air is circulating at that temperature. The meat is, therefore, reduced to about 38 degs. Fahr., and this process occupies something like a whole day, after which the sides are passed into the curing cellar. Here they are finally trimmed, and the hind feet are removed, or, as the case may be, they are dismembered and converted into hams, middles, etc. In the case of "Wiltshire" sides they are pumped with a recognised pickle, and are then sprinkled over with curing antiseptic, on the top of which is placed a heavy sprinkling of curing-salt. The same process takes place with almost every part of the pig, and on the average about two weeks are allowed for the curing, but of course this is modified according to the character of meat it is intended to produce. Hams, for example, are not pumped and are kept about 21 days in salt. When the meat is cured it is drained free of pickle, and is then removed from the cellar and washed. It is then, if wanted as smoked bacon, placed in the smoke stoves, or if not wanted as smoked bacon, or hams, is sent away in the green state.

The various products of the Roscrea Bacon Factory are:—Wiltshire sides, Dublin cut sides or "middles," hams, rolled fore ends, rolled three-quarter sides, and "game." The products of the auxiliary departments are:—Sausages, black puddings, lard, cooked hams, etc.

Other Features.

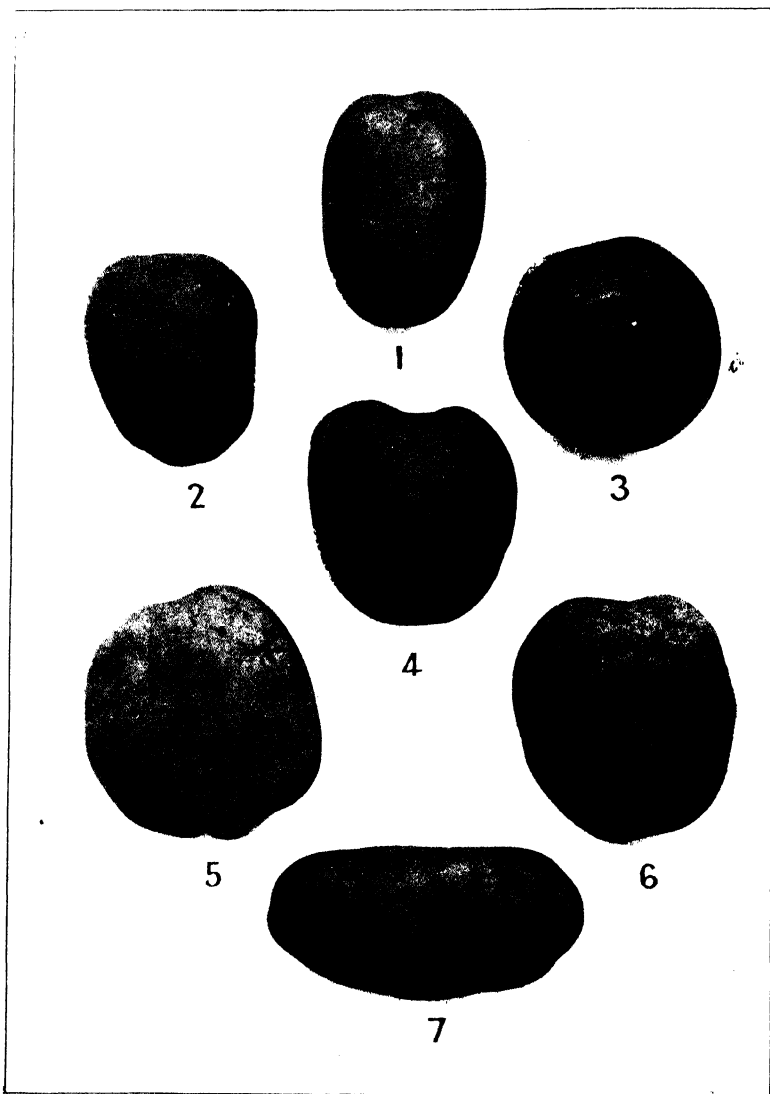
In connection with all these various products there is a certain amount of skill and experience necessary, and the factory is fortunate in having as

manager one who thoroughly understands the manufacture of every product which is produced from the pig, in the person of Mr. J. W. Welsh. Mr. Welsh has had the advantage of experience in the best bacon factories not only in the United Kingdom, but in the United States. He also possesses the distinction of having attained at successive London Exhibitions some thirteen medals for bacon-curing in open competition with the manufacturers of the United Kingdom.

In all bacon factories the auxiliary departments call for very close attention, and we therefore find that the sausage-room and lard-room at Roscrea are completely equipped with machinery capable of producing sausages and lard in the most economical and best way. The notable feature of the factory, also, is the motive power, which consists of a 50 h.p. gas engine and suction gas-producing plant. This gas engine is connected up to the main shaft and actuates the whole of the machinery throughout the factory. The principal machine is, of course, the refrigerator, which is called upon to maintain the chill-room at 38 degs. Fahr. and the curing-cellar at 42 degs. Fahr. The refrigerating machine is a No. 7A "Douglas" machine of the horizontal pattern, and the refrigerating gas used is sulphurous and anhydride. It is connected to the chill-room by means of an independent air-cooler which provides the circulation of cold air, and it is also connected with a complete system of brine drums which cover the ceilings of both the chill-room and the cellar, through which cooled unfreezable brine is constantly flowing. It is necessary however, in a bacon factory to have a plentiful supply of steam, and this is supplied by a vertical steam boiler which provides all the steam necessary for the scalding, cooking, cleansing, etc.

It only remains to be said that in such a factory there are, of course, offices suitable to the business, and there are also many necessary appliances of a minor character which are called into use in the various departments. The situation of the factory is such that no trouble arises from the surroundings and the drainage is perfect, so that all the conditions are hygienic and perfect in every way. The factory started on January 2nd, 1908, and has been working constantly, handling about 200 pigs per week ever since. A feature of the business is that, whereas, the factories which exist in Ireland at the present day rely upon the export of their products, the Roscrea factory has so far not been called upon to look for markets outside of Ireland, and apparently will not be called upon to do so for a long time to come. The total staff employed is about 32, so that the weekly expenditure in wages is not a very great item. At the same time desirable employment is given to workmen in the vicinity.

The launching of a farmers' co-operative bacon factory in Ireland is somewhat in the nature of an experiment, and the progress of Roscrea is being closely watched by many Agricultural Societies throughout the United Kingdom. This factory possesses many initial advantages, such as a guaranteed supply of pigs, a large body of shareholders, who in themselves form an important *clientele* in so far as the products of the factory are concerned. It has also the advantage of having started with a comparatively small capital, and, indeed, it might be said that for such accommodation as is found at Roscrea, no such place has been designed or constructed so cheaply before.



Samples of Potatoes grown at Hamel State Farm.

SWEET POTATOES.

(*The Cluster*).

On the opposite page is an illustration of three samples of a variety of the Sweet Potato grown at Hamel Experimental Farm, to which Mr. Berthoud has given the name of *The Cluster*. It is described as very prolific and of good tuber quality. The tubers are found all in a cluster close to the stem of the plant, and therefore very easy to dig and gather, which is an important feature. Mr. Berthoud regards it as by far the best kind he has yet tested. He obtained a small seed tuber by post last year from a friend in the Sydney Department of Agriculture. This he grew in a pot in the greenhouse during winter, then divided the plant in spring and set the parts in the open, the result being that he has now a fine lot of tubers similar to those in the illustration.

BLACK ROT OF THE SWEET POTATO.

As a rule the sweet potato is less affected by diseases of fungoid and other nature than are other kinds of potatoes.

The tuber illustrated in this issue shows blotches caused by a fungus named by mycologists *Ceratocystis fimbriata*. It is liable to attack the plant at any time during its existence, and even after the crop has been gathered. The point of attack is at first very minute and often escapes detection. As time goes on it increases in size and depth until the whole tuber is destroyed.

No diseased tuber should be used for producing sets. Any young plant suspected of being affected should be discarded. A sickly plant is more liable to attack than a vigorous one. As the spores of the disease retain their fertility in the ground for a long period, it is a risk to grow sweet potatoes on land from which diseased tubers have been dug the season or some years before. Manure from a heap on which diseased tubers have been thrown often carries the spores of the fungus. All diseased plants or parts of plants should be burned. Sprayings with Bordeaux mixture protect the exposed parts of the plant against the disease. Only healthy tubers should be stored. It is a good precaution to dip them into a solution of such fungicide as ammoniacal carbonate of copper or a three per cent. solution of formic acid of commerce.

POTATO BLIGHT.

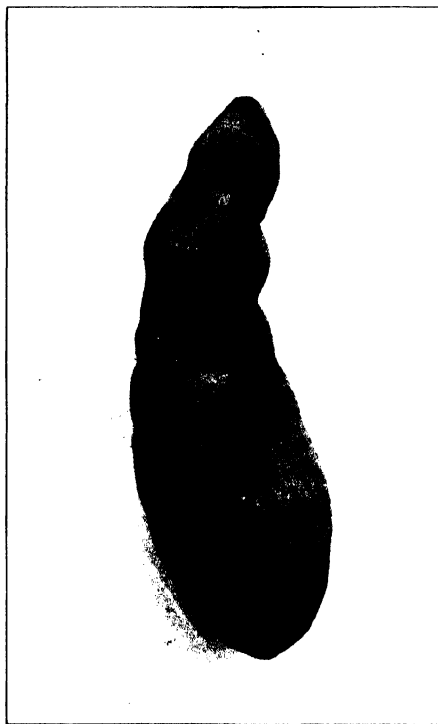
The appearance of potato blight in County Mayo and Tipperary has caused much alarm in potato-growing districts in Ireland, and the Department of Agriculture has urged upon farmers the necessity for taking immediate steps to spray their crops. Overseers are provided in affected areas whose duties are to repair spraying machines which are out of order, charging only the cost price of new parts obtained; to sell spraying machines and spraying materials, where such cannot be obtained locally, at cost price to farmers within certain limits of valuation, and generally to give demonstrations in spraying as well as such instruction and advice as may be required by persons in their districts. In districts where horse tillage is common, the Department grants loans for the purchase of approved horse-spraying machines to persons selected by county committees, and who are prepared to spray their neighbours' crops at charges fixed by the committees.

The Department recommends the use of washing soda in preference to lime for the following reasons:—(1.) The spraying material adheres longer to the foliage of the plants and is not so readily washed off by rain. (2.) The mixture can be more easily prepared. (3.) The nozzles of the machine are not so liable to become stopped with grit or refuse material. If washing soda is used and the mixture is carefully made, there should be no sediment.

The mixture is made up in the following proportions:—2lbs. sulphate of copper of 98 per cent. purity; 2½lbs. washing soda of 98 per cent. purity; 10 gallons clean water; or, if a 40-gallon paraffin barrel of the mixture is to be prepared, four times the above quantities will be required. Dissolve the sulphate of copper in a separate vessel to that in which the washing-soda is dissolved. Pour the latter into the copper sulphate and stir continuously. The following test can be made:—Apply blue litmus paper to the solution, if it turns red more washing-soda must be dissolved and added in small quantities until fresh paper put in the solution remains blue. It is then fit for use as a fine spray.

As sulphate of copper dissolves slowly in cold water, it will be found better to use hot water first, afterwards adding the required amount of cold water. Each solution can be kept separate for several days; but when the mixture is made it should be used immediately, as it rapidly deteriorates. All vessels coming in contact with the sulphate of copper should be of wood and not of metal, and they must not be afterwards used for domestic purposes. The washing-soda solution should be poured into the sulphate of copper solution, and not conversely. Spraying is a prevention, it should be done before the disease shows itself; two or three sprayings at intervals after rain and with growth of new foliage will be advisable. Spraying should be carried out during dry weather.

For an average crop of potatoes with fully developed foliage, about 100 gallons of mixture per acre will suffice.



Sweet Potato affected with Black Rot.

A NEW DAIRY ANIMAL.

A domestic animal that is quite unknown to the majority of husbandmen in Europe is the Hungarian buffalo, which in some respects rivals the best known breeds of cattle for dairy purposes. According to some recently published particulars there are a considerable number of these buffalo raised in Hungary. In 1895 they numbered 130,000, while the ordinary cattle numbered nearly six million head. I have been unable to ascertain if the numbers of the buffalo are increasing; but, from the much larger number of domestic cattle, it may be naturally inferred that they are more profitable generally than the buffalo. For dairy purposes the buffalo has great merit, the yield of milk is less than that of the ordinary dairy cow; but the profit lies in its peculiar richness in fat. The average milking period of the buffalo was 285.8 days, against 236.9 of the Hungarian dairy cow; but the yield in gallons was 316 and 394 respectively. The percentage of fat in the buffalo milk is set down at 7.52, as against 3.98 in the milk of the dairy cow. It is stated that the buffalo cows yield the equivalent of 500 gallons as against 280 gallons given by ordinary cows. An important difference has been discovered between the two kinds of milk when passed through the separator. Ordinary milk so treated retains but an infinitesimal quantity of fat, the buffalo separated milk contains 2.5 of fat. This is supposed to be owing to the fat globules in it being excessively small. As a consequence of this peculiarity, the buffalo milk can be utilised for the manufacture of cheese. Whether the Hungarian buffalo will ever take a leading place in the estimation of dairy farmers remains to be seen. Much may be done in the way of improving the race by skilful selection, but we know nothing of their beef-producing qualities, and that is almost as important as the high quality of their milk.—*Australasian*.

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PREVENTING RAPID DECAY OF RIPE FRUIT.

The rotting of ripe fruit is due to the presence of living organisms, and any process which will prevent the development of these organisms will enable the fruit to be kept in a perfect condition for a period of a week or more. Experiments made at the laboratory at Kew showed the number of days during which the fruit, after special treatment, remained quite sound, after a similar quantity of untreated fruit from the same lot had become mouldy or decayed.

Strawberries kept good for four days longer than untreated fruit.

Gooseberries kept good for seven days longer than untreated fruit.

Cherries kept good for seven days longer than untreated fruit.

Pears kept good for ten days longer than untreated fruit.

Grapes kept good for four days longer than untreated fruit.

The fruit experimented on was not selected, but purchased from shops, or in some instances from sellers in the street.

The above table applied to fruit that was quite ripe when experimented upon, but it was ascertained that if fruit is treated before it is thoroughly ripe it is equally well preserved, and the normal course of ripening and the flavour were not found to be interfered with in any way, as is the case where fruit is kept for some time in a refrigerator.

The process is very simple, inexpensive, and said to be perfectly free from danger.

In the case of fruits where every part is eaten, as strawberries, etc., the fruit should be immersed for ten minutes in cold water containing 3 per cent. of commercial formalin (equalling 40 per cent. of formaldehyde). On removal the fruit should be immersed for five minutes in cold water, and afterwards placed on wire netting or other similarly open material to drain and dry.

When the fruit has a rind or skin that is not eaten, the immersion in water after treatment in the formalin solution can be omitted with advantage.

Various other preservatives were tested, but when the whole of the requisite points—efficiency, ease of application, cheapness, and absolute freedom from danger arising from the use of the preservative—were taken into consideration, formalin proved the best. —*Mark Lane Express.*

A FIBRE PLANT.

(*Marsdenia Leichhardtiana*.)

A sample of the pod or fruit from the plant generally regarded as the Australian kapok, given to it because of the fibrous, thistle-like down which it produces, was submitted to Dr. A. Morrison for examination. His report is as follows:—

413 Rokeby Road,

Subiaco, 22nd July, 1908.

The Under Secretary for Agriculture.

Sir.—I beg to report as follows on the fruit submitted for examination:—

The fruit is that of *Marsdenia Leichhardtiana*, a plant belonging to the natural order *Asclepiadaceae*. It is indigenous in the warmer latitudes of Australia, from West to East, and some other plants of the same family have similar fruits. The pods, and also the thickened roots, are eaten by the natives, and the name “Coghlow” or “Kogalow” appears to be applied by them to either the root or pod.

The silky contents of the pod are, as in the cotton plant, appendages of the seeds, and if the silky fibres are always as flexible as those of the sample, they would make a very good stuffing for cushions or pillows, being soft and elastic and free from any hard or rough substance. I believe also that the fibre retains its silky lustre after exposure.

The question of the fibre being likely to become of commercial importance would depend in the first place on the quantity available. The plant is a climber, and it is hardly likely that a large quantity would be found growing in a natural state. The results of cultivation of the plant could only be determined by experiment.

I have, etc.,

ALEX. MORRISON.

Curiously enough there appears in the July number of the *Agricultural Gazette of New South Wales* an account of a fibre plant written by Mr. Chas. A. White, F.R.H.S., late Forest Officer at Coolgardie, and now in the Uganda Protectorate, which seems to show a striking affinity to the one referred to by Dr. Morrison. Mr. White states that he found growing in an old deserted camp near Bulla-Bulling a plant producing white clusters of flowers and large, bladder-like capsules containing a fluffy, silky fibre like the Scotch thistle, emitting a white, milky substance similar to rubber-latex. He thought it must have been brought there by seed in imported forage. He has since travelled from the Cape to the Zambesi, Portuguese Africa, the Equator and Congo, and in isolated parts in all these countries he saw this particular plant, but not cultivated. Nobody knew its value, only that the silky cotton substance could be used like kapok for stuffing furniture, but would not pay to export.

While planting rubber in Uganda, at the head of the Nile on the Victoria Nyanza, Mr. White being in need of a rope, told a native to get one, and much to his surprise saw the boy pull up this very plant, draw the fibre, and then twist it into a rope of remarkable strength. He sent samples of the

rope, fibre, and botanical specimens to the Imperial Institute in London, with the result that the plant was identified as *Asclepias semilunata*, and that the fibre, if properly prepared, was worth £35 per ton on the English market. Examination of the samples from Uganda has shown, it is stated, that the fibre is very strong, of excellent quality, and would doubtless be suitable for manufacture of cordage. Messrs. Forsyth & Co., of Sydney, report in this connection that "the fibre is equal to Manila, and is valued at £35 per ton. The length and colour are good. They would give £35 per ton for it, but it must not be less than *four feet* long."

This statement and the fact that Mr. White is careful to say that the London price he quoted was for the *bast* of the plant, and not for the silk-cotton or down which adheres to the seed, indicate that the commercial value of the plant does not lie in its fruit, as is the case with true cotton.

Mr. White expresses his opinion that the plant can be profitably grown, and that he has seen it at an elevation of 7,000 feet above sea-level at Johannesburg, also in Rhodesia and in Australia, but has not seen it near the coast, though it may succeed near the sea.

The description given above of this plant coincides with that of a plant with similar characteristics and flowering, downy fruit, found in the Geraldton district, where it is mistakenly called cotton.

AMERICAN AND ENGLISH BEEF SUPPLY.

The strain on the cattle industry of the United States to supply demands of foreign trade and home consumption is apparently creating a serious question in that country, and there is a movement to find new forage and depasturing areas in order to increase the number of stock. A despatch dated, Washington, June 15, states :—"To increase the supply of beef and thereby lessen its cost to the American householder is one of the principal objects underlying the efforts of the Department of Agriculture to secure a product that will thrive in the semi-arid regions of the North-west. Beef and beef products are said to have reached the highest prices recorded in twenty years, and the dealers claim that this is due to the scarcity of cattle. It is to increase the supply of beef by increasing the proteid of the West that the Department of Agriculture has again sent N. F. Hansen, of Brookings, S.D., to make a thorough investigation of the plant life of Northern Russia and Siberia. Professor Hansen will visit the sections of Northern Europe and Asia, where climatic conditions are similar to those of the semi-arid lands of Wyoming, Colorado, Montana, and the Dakotas. If an alfalfa or clover can be found which will withstand these climatic conditions a hundred head of cattle could be grazed upon the land now required by ten."

According to the *Mark Lane Express* of June 29, there has been a serious depletion of the meat supply in Great Britain, followed by increase in prices. That journal says, "The short supply of cattle in this country, together with

reduced importations of live stock from Canada and United States are given as the prime causes of the scarcity, and in consequence the enhanced prices to the consumer."

So far as the home supply is concerned, there are various suggested causes for the present scarcity of beef, but there can be no doubt that the increase in dairying in the way of milk production has led to a less number of cattle being fed for beef, and the effect, together with reduced importations from abroad, is now being felt.

PREVENTION OF TUBERCULOSIS IN DAIRY CATTLE.

(Mark Lane Express.)

For the purpose of discussing the means we should employ to prevent the existence of tuberculosis in dairy cattle, it would perhaps be well in the first place to shortly state the nature of the disease and the method in which it spreads amongst cattle, and then to consider the more practical part of our subject—viz., its prevention or suppression in a dairy herd.

Tuberculosis, or consumption, is a contagious disease, due to a small living organism or germ, which, having gained access to an animal's body, multiplies in its organs and tissues.

Without the presence of this germ, known as "bacillus tuberculosis," no cattle, even the most weakly constituted, will develop tuberculosis; but if this bacillus is present in a cowshed, even the strongest constituted animals are liable to become victims of the disease.

The usual means of entrance of the bacillus to the animal's body is through the mouth or nostrils.

In by far the greater proportion of diseased cattle the bacillus has gained its first entrance by the mouth; that is, the animal has taken it in with its food or water.

Congenital tuberculosis in cattle, and by that is meant a calf affected with the disease when it is born, is extremely rare. In the abattoir of Edinburgh only one case was found in five years, although about 6,000 carcasses of young calves are examined each year; we can go further even than this, and state that tuberculosis is rarely found in calves under six months old.

Having gained access by the mouth or nostrils, the bacillus may become located and grow in almost any part of the body; we may find indications of its presence in the lungs, bowels, glands (or kernels), liver, udder, spleen, around the heart, in the uterus or calf-bed, and even in the joints and bones.

But in cattle which are young and strong, and particularly in those where there is no family predisposition to tuberculosis, the animal's strength of constitution may overcome the activities of the bacillus, and it will recover from the

disease. There is no doubt that an animal may, and in many cases does, make such a recovery.

In others the disease becomes latent or hidden in the body, the animal showing no indication of being diseased; but some unfavourable occurrence, such as taking a chill, having a bad time in calving, retention of the afterbirth, or excessive milking promoted by the inordinate use of brewers' or distillery grains and other milk-stimulating methods of feeding will cause the animal's constitution to become weak, and enable the disease germs to get the upper hand; they will then rapidly multiply, the centres of the disease in the body will increase in numbers, and the cow will become feverish and evidently ill, developing what is known as clinical tuberculosis.

This is always accompanied with loss of flesh, frequently with rapid breathing and coughing, and later on with diarrhoea, and it may be with discharge from the breeding organs or with swelling of the throat or udder.

In an animal in this condition the lungs, bowels, or breeding organs, or it may be all of them, will be involved in the disease, and the germs of tuberculosis will be given off from these diseased parts in the act of coughing, with the diarrhoea, in the discharges from the breeding organs, and in some cases in the milk.

Sick cows with such symptoms are manufactories of tubercle germs, which they distribute all round them, contaminating drinking water and fodder, and even the air itself.

To such diseased animals the spread of tuberculosis amongst a herd is due, and, bearing in mind that the swallowing or breathing in of germs set free is the only method by which a healthy animal becomes affected with tuberculosis, it is obvious that the first and most important consideration in the prevention of the spread of the disease to healthy cattle is the destruction of all animals which are disseminating the disease germs.

A cow affected with clinical tuberculosis should be got out of the herd, isolated, or destroyed with the same amount of dispatch that we should remove a glandered horse from a stud.

The cowkeeper may have taken steps to secure the proper lighting, ventilation, cleansing, draining, water supply, and air space in his cowshed, but as long as he permits a cow clinically affected or visibly ill with tuberculosis to remain in it, even for a few hours, he will never get tuberculosis out of his herd.

Besides absolute recovery or the development of fatal clinical tuberculosis, there is a third course which this disease often takes in the animal's body.

In many cows, indeed in most cows, which are well cared for, not excessive milkers, and which are lucky enough to escape the ordinary accidents of life, the latent or hidden disease, although always present, does not take on activity or develop during several years, and the cow is fatted off or dies from some other disease without any evidence of tuberculosis being observed during her life, unless its existence has been discovered by the use of the tuberculin test.

Having got rid of the clinically-diseased cow, the next step for the prevention of the spread of the disease is to thoroughly disinfect the cowshed.

All food which the sick animal may have breathed upon, and all her bedding and dung, should be burnt. The mangers, both inside and out, the wooden partitions, the walls, and the floors should be lime-whited with hot lime, containing a pint of crude carbolic acid to each pailful of limewash.

In the case of iron or glazed mangers or partitions thorough washing with boiling water and dousing with strong carbolic solution must be insisted upon.

After this is done, expose the building or stall as much as possible to the open air for some days before it is again occupied.

In passing, it may be remarked that a common drinking place for all the cows of a herd, unless it is a running stream, is a source of danger, as the water may be contaminated by a diseased animal; cases are on record, also, where the herbage of a small field has become so contaminated by a sick cow as to infect other animals grazing in the same enclosure.

The next point for the suppression of the disease is to deal with the cows which have been exposed to infection by the clinically-diseased animal.

All cows which have been in contact, and this means all animals in the same shed or field, should be tested with tuberculin, and a private mark put on the horn or ear of all which react to the test. The ideal course to pursue would then be to permanently remove to a healthy shed or pasture all the cattle which did not react, but this would often be attended with almost unsurmountable difficulties; failing this, if the number of reacting cattle is small (unfortunately it is usually quite 30 per cent., and in very large herds an even higher percentage), they may be removed, allowing only those which pass the test to remain.

In most cases, however, the healthy and reacting must, from force of circumstances, remain together in the same shed or pasture, but the owner, having his private mark on the horn or ear of reactors, knowing that these cows may become a danger at any time, must always be suspicious of them, and be on the look out for any sign of illness, loss of condition, or cough, and at once isolate the animal, cleanse and disinfect her standing and immediate surroundings, and await developments.

It is advisable to repeat the first testing with tuberculin after an interval of three months.

In all respects, excepting increased surveillance, the non-reacting and reacting cows should be treated alike.

The milk of reactors which do not show clinical symptoms of the disease can be used with absolute safety both for man and beast.

New animals should be put into another shed, or the original shed partitioned off, and they should be placed only with cows which have satisfactorily passed the test, for, as we have seen, the spread and continuance of the disease depend upon putting susceptible young cattle into infected herds and healthy heifers amongst diseased cows.

THE CEARA RUBBER TREE.

The Ceara rubber tree (*Manihot Gloziowii*), of which there are some seventy species indigenous to Brazil, has been introduced into several countries with varying success. It yields a rubber of high commercial value. In its native habitat the tree appears to flourish in poor, sandy soil, and at all elevations from sea-level to 3,500 feet. It is of a hardy nature and grows rapidly, attaining a height of 40 feet and 50 feet. In Brazil tapping for latex begins when the tree is five or six years old, at which age the trunk is 8 or 9 inches in diameter. The rubber is of dark amber colour, and is obtained in three different grades.

One of the most extensive plantations of the Ceara is in the Mozambique Company's territory in East Africa, where it was first introduced in 1895; there being at the present time as many as 75,000 trees in different parts of the territory. The total average yield of dry rubber per tree at present stands at 112.5 grammes (3.97oz.), made up of "biscuit" and "scrap" in equal quantities, the London market prices for which ranged from 4s. 11½d. to 5s. 7½d. and 3s. 10¾d. to 4s. 2d. per lb. respectively. About 175 trees were growing to the acre, and the approximate yield of dry biscuit and scrap rubber per acre was 19.69 kilos. or 43.42lbs.

AUSTRALASIAN WOOL MARKETS.

Messrs. Dalgety & Co., in their annual review, state that though the further increase in sheep numbers for the year is 5,075,555, the total clip of the past season (for export) has fallen short of its predecessor by 32,357 bales, the actual output being 2,057,831 bales in 1907-8, as against 2,090,188 in 1906-7. It is of the utmost importance to note that the actual decrease in production is much heavier than statistics given in bales indicate as the better grown clip of 1906-7. Supposing the difference in shrinkage between the two clips to be 3 per cent. in favour of the 1906-7 output, it would mean that the amount of actual clean scoured wool produced during the past year (basing the 1906-7 clean washed yield at 47 per cent. on average, and that of 1907-8 at 44 per cent.) has been 31,500,000lbs. less than during the preceding twelve months.

There will be diminishing supplies during 1908 and 1909, and values should pursue an upward course as soon as confidence is sufficiently restored and the trade realises that the past clip from Australasia shows a shrinkage, and that the next one will do likewise.

The 1,351,121 bales which were realised upon in Australasian markets averaged £13 0s. 2d. per bale, and presuming that that portion of the clip

which has been sent direct to London will do likewise, the net gain in wealth from wool production in Australia and New Zealand (for export) for the past twelve months will have been £26,768,952, which though £2,816,788 less than the preceding year, eclipses that of 1905-6 by £1,507,941, and that of 1904-5 by £6,576,268.

Australasia is so largely dependent upon the pastoral industry for her wealth—wool and kindred products amounting in value to £45,000,000 out of the total exports of £90,000,000—that a drought or heavy decline in wool values is nothing less than a national calamity.

By far the larger proportion of the clip has been dealt with in Australasian markets, and again the policy of the majority has proved correct. Taking into consideration that the fall in values acted in the nature of a temptation to ship, it is worthy of note how consistently woolgrowers have supported their own markets in preference to taking risks which on former occasions have proved so disastrous. The pity is that every bale was not sold on this side, for shippers have indeed fared badly in London, where realisations so far made have resulted in a loss on the average of about £4 per bale.

SHEEP RETURNS.

That 1907 was not such a good season in Australasia as was 1906 is briefly, but nevertheless graphically, illustrated by the sheep returns, which show that at the close of 1907 there were returned 108,871,681, a net increase of 5,075,555 head for the year, whereas 1906 showed an increase over and above 1905 of 10,261,547 head. There were more ewes to breed from last year than for ten years past, but the percentage of lambs reared was disappointing, while the increase in the slaughterings also tended, though in a comparatively small degree, to prevent the net increase from continuing at such a rapid rate as during the preceding year.

The returns from the various States and New Zealand which we give herewith are to latest available dates:—

States.	1907.	1906.	Increase.
New South Wales	44,555,879	44,132,421	423,458
Victoria	14,146,734	12,937,440	1,209,294
Queensland	16,738,050	14,886,438	1,851,612
South Australia	7,023,000	6,661,217	361,783
West Australia	3,694,852	3,340,745	354,107
Tasmania	1,729,394	1,729,394	—
Commonwealth	87,887,909	83,687,655	4,200,254
New Zealand	20,983,772	20,108,471	875,301
Australasia	108,871,681	103,796,126	5,075,555

GOVERNMENT LABOUR BUREAU.

Mr. James Longmore, superintendent of the Government Labour Bureau, has furnished the following report for the month of July:—

Perth.

Registrations.—The total number of men who called during the month in search of work was 918. The trades or occupations were as follow:—Labourers, 341; handy lads, 80; farm hands, 67; handy men, 64; cooks, 42; bushmen, 39; carpenters, 33; gardeners, 22; miners, 21; clerks, 14; bricklayers, 10; blacksmiths, 9; drivers, engine-drivers, grooms, hotel hands, and strikers, 8 of each; yardmen, 7; bakers, 6; caretakers, fitters, kitchenmen, and painters, 5 of each; butchers, paperhangers, pastrycooks, and orchardists, 4 of each; brickmakers, groom-gardeners, printers, sailors, and shearers, 3 of each; and 72 miscellaneous.

Engagements.—The engagements for the month numbered 272. The classification of work found was as follows:—Bushmen, 84; labourers, 47; farm hands, 26; handy lads, 21; handy men, 15; sawmill hands, 15; carpenters, 9; cooks, 8; fencers, 8; boys for farms, 4; gardeners, 4; bricklayers' labourers, orchardists, and woodcutters, 3 of each; and 22 miscellaneous.

Northam.

Registrations.—The applicants for work numbered 14, classified as follow:—Clearers, 5; handy men, 5; and farm hands, 4.

Engagements.—The engagements were 6, viz., clearers, 6.

Kalgoorlie.

Registrations.—The number of men who called during the month numbered 24, classified as follows:—Handy men, 9; clerks, 4; labourers, 4; carpenters, 2; engine-drivers, 2; blacksmiths, fitters, and handy youths, 1 of each.

Engagements.—There was one engagement—clerk.

The female servants who called numbered 6, viz., waitresses, 2; cooks, generals, and light generals, 1 of each. There was one engagement—a general.

Women's Branch, Perth.

Registrations.—At this branch the applicants for work were 195. The classification was as follows:—Laundress-charwomen, 38; generals, 30; cooks, 28; housemaids, 24; housekeepers, 16; waitresses, 12; light generals, 11; lady-helpers, 11; useful girls, 10; nurse-needlewomen, 5; nursemaids, 5; and 6 miscellaneous.

Engagements.—The engagements numbered 70, classified as follow:—Laundress-charwomen, 33; generals, 10; useful girls, 6; housemaids, 4; housekeepers, 4; light generals, 4; cooks, 3; and 6 miscellaneous.

General Remarks.

The number of men who called at the central office, Perth, during the month in search of work was 918. This number, as compared with that for the month of July last year, is 176 more. The engagements totalled 272, being 119 in excess of the number for the corresponding month of 1907.

There were 105 men assisted by railway passes. The fares refunded amounted to £36 18s. 10d., and the sum of £3 16s. 7d. was received from employers to send workers.

MARKET REPORTS.

During the month the markets for produce have maintained a steady tone, and supplies kept pace with demand. Good medium chaff in Perth has ranged from £5 to £5 7s. 6d.; f.a.q. from £5 12s. 6d. to £6 2s. 6d.; straw chaff, £2 7s. 6d. to £3 7s. 6d.; oaten chaff, £4 12s. 6d. to £5. In the wheat market, 3s. 10d., 3s. 11d., and 4s. 3d. were realised. Oats, 3s. 8½d. for crushed imported; local, 3s. 5d. At Kalgoorlie, prime green wheat chaff to £6 15s.; good, £6 7s. 6d.

Live stock markets have ranged as follows:—Good wethers, 15s. 3d. 18s., 18s. 4d.; ewes and lambs, 16s. 9d., 20s., 23s. At the country sales fat sheep fetched 25s. 9d.; hoggets, 15s. 11d. to 18s. 6d.; Kimberley ewes, 10s. 6d.

Horses:—The following prices are reported: Draughts, £40, £41, £70; geldings, £38 to £50; aged, £14 10s.; light, £5 to £15; cart, £10 15s.; brambies, £4 and over.

Cows:—From £5 5s., £9 to £12 10s. for good milkers.

Pigs:—Porkers, 33s., 35s., and 36s.; slips, 18s.; baconers, 48s. 6d.; stores, 20s.; weaners, 13s.

Fruit, Vegetables, etc.—The Producers' Markets, Ltd., report for August 14:—Large consignments forward for to-days sale, the greater majority being citrus fruit, many lots being of prime quality. Sales as follows:—Apples, Nickajacks, 10s. 6d. to 14s. 6d.; Yates, 10s. 6d. to 13s. 6d.; Jonathans, ex store, 10s. 6d. to 13s. 6d.; Cleopatras, ex store, best 10s. to 12s. 9d., medium 8s. 6d. to 9s. 9d.; Rome Beauties, prime 10s. to 12s. 6d., medium 8s. to 9s. 6d.; Dunn's Seedling, 8s. 6d. to 11s. 6d.; Five Crowns, ex store, 8s. to 9s.; Ben Davis, 8s. 6d. to 10s. 6d.; Rokewoods, 7s. 6d. to 9s. 9d.; other varieties, 7s. 6d. to 9s. 6d.; medium and inferior, all varieties, 6s. to 8s. Oranges, best Navels, dumps 11s. to 14s. 9d., flats (best) 8s. 6d. to 11s., medium and inferior 7s. 6d. to 8s.; ordinary oranges, 6s. to 9s.; medium and wind-falls, 4s. 9d. to 5s. 9d. Mandarins, best, 10s. to 15s.; medium and small, 6s. 6d. to 9s. 6d. Lemons, best, 5s. to 7s. 6d.; medium and large, 4s. to 4s. 9d. Cape Gooseberries, 3½d. to 4½d. Pears, Broome Parks, 12s. 6d. to 14s. 6d.; other varieties, 10s. to 13s. Vegetables—Full market, large attendance of buyers, all lines being cleared at satisfactory prices. Cabbage, 4s. 3d. to 7s.; others from 2s. 6d.; red, 8s.; Savoy, 4s. 3d. to 8s. 6d. Cauliflowers, 4s. to 6s. 9d.; medium, from 2s. 6d.; small, 1s. Pumpkins, I.B., 5s. 6d. to 6s. 9d.; bugle, 3s. 6d. Carrots, 1s. to 1s. 11d. Parsnips, 7d. to 1s. 7d. Turnips, 7d. to 10d.; small, from 3d. Beet, 1s. 5d. to 1s. 9d.; small, 5d. to 7d. Swedes, 8d. to 1s. 2d.; bulk, 5s. 3d. to 6s. 9d. Lettuce, best, to 3s. 7d.; others, 8d. to 1s. 4d. Celery, 2s. 9d. to 4s. 1d.; other, 6d. to 1s. 7d. Rhubarb, 1d. to 2d.; inferior, from ½d. Leeks, 6d. Potatoes, country, 14s. 3d. Poultry—Best table birds, 6s. 6d. to 8s. 9d.; medium and small, 5s. 6d. to 6s. 3d. Hens, 5s. to 8s. 6d.; medium and small, 4s. to 4s. 9d. Ducks, best young fats, 7s. to 8s. 9d.; medium and Indian Runners, 5s. 6d. to 6s. 9d. Turkeys, best heavy gobblers, 18s. to 20s.; medium and light, 12s. 6d. to 16s. 6d.; hens, 8s. 6d. to 13s. Geese, 9s. to 12s. Pigeons, 1s. 6d. to 1s. 9d. Eggs, best local, 1s. 2½d. to 1s. 4d.; country and ducks, 1s. 1d. to 1s. 2d. Pork, 6¼d. to 6½d. Honey, best, 12s. to 14s.; medium and inferior, 10s. to 11s. 6d.

ADELAIDE PRODUCE MARKET.

Adelaide, August 12.

Wheat and flour are steady at late rates. Bran and pollard, 1s. 3d. Oats, unchanged. Chaff is firm, the majority of cutters asking up to £6 10s.

MELBOURNE PRODUCE MARKET.

Melbourne, August 12.

Wheat, 4s. 2½d. Oats, 3s. 1d. to 3s. 3d. Maize, 4s. 2d. to 4s. 2½d. Chaff, £6 5s. to £7 5s. Potatoes, £5 10s. to £6 5s. Onions, £9.

COLONIAL DAIRY PRODUCE.

Messrs. W. Weddel & Co., under date London, July 10, make the following report on the Colonial produce market:—

Butter.—The period of hot and dry weather which has prevailed since the middle of June has come to an end. Thunder, rain storms, and mild gentle rains have been pretty general, and the pastures, which were showing signs of want of rain have been replenished. The demand for Australian and New Zealand butter has become nominal, as supplies are in a very small compass, and will not increase until the next season's butter arrives in September. Prices are nominal for Australian at last week's figures. New Zealand is making 114s. and 115s. per cwt. Shipments this week are *nil*. Canadian butter is making its appearance on our markets, although it is unusually late. The quality is very good, and prices exceedingly high for the time of year, 114s. and 116s. being made for both salted and unsalted. Shipments are weekly increasing from across the Atlantic. Last week they were over 8,000 packages.

The Copenhagen official quotation has been raised by three kroner, and is now 7s. higher than it was twelve months ago, and the highest it has been in July for the last 25 years. Siberian supplies are increasing and arrivals clear rapidly at 102s. and 108s., and for special quality 110s. is made. French prices are very erratic, some of the shippers are raising and others lowering their quotations, owing to a rivalry among them, and very large sums are being lost in consequence. The Board of Trade returns for June show for that month an increased import of 35,357 cwt., and the imports for last week were 93,789 cwt., against 84,781 for the same week last year. This increase of 9,008 cwt. was made up of an increase of 4,893 from Denmark, 1,811 from Holland, and 2,219 from Canada.

Cheese.—The market is very quiet, and prices of Canadian show no change on the week, while New Zealand is a shilling lower.

The wholesale prices for salt butter were:—Australian choicest, 108s. @ 110s.; finest, 102s. @ 106s. New Zealand, choicest, 112s. @ 114s.; finest, 102s. @ 106s. Canadian, choicest, 114s. @ 116s.; finest, 102s. @ 112s. Danish, choicest, 118s. @ 120s.; finest, 114s. @ 116s. Russian, choicest, 106s. @ 110s.; finest, 102s. @ 104s. French, choicest, 110s. @ 112s.; finest, 108s.

LOCAL PRODUCE MARKET.

The W.A. General Produce Company, 231 Murray Street, Perth, report as follows for the week ending Wednesday, 14th August, 1908:—

Business during the past week fairly good; stocks of various produce rather short and prices have ruled abnormally high. Detailed particulars as follow:—Bacon—supplies fair, values firm, with tendency to harden. Hams—usual supplies and demand. Lard—very scarce, and in consequence of the great scarcity of butter prices ruled high for lard and dripping. Butter—supplies Melbourne and Sydney more plentiful; a drop of 4d. per lb. has taken place within the last five days and a further fall imminent. Cheese—still very short, both on spot and sources of supply, values continue high. Eggs—local, increased supplies from day to day, and values in consequence easy. Potatoes—rather short on spot, also Tasmanian values have advanced materially. Onions—good demand, values quite firm. Chaff continues scarce, and values for prime quality very high; inferior lines more plentiful. Millers' lines gradually firming and operations confined to hand to mouth. Fruit—large supplies of citrus sorts, likewise fair quantities of apples both from country and cool stores; in many instances the latter need repacking owing to many being bad. Vegetables—very scarce and high values ruling. Poultry—young fleshy roosters in good demand; hens and aged roosters not much in favour; good outlet for young fat turkeys and ducks. Carcase pork in very good demand; likewise veal.

Dairy and Farm Produce.—Bacon, prime sides, 9d. to 9½d. per lb. Hams, best, 1s. 1½d. to 1s. 2d. per lb. Lard, 10½d. per lb. in bladders. Butter, prime quality, 1s. 8d. to 1s. 9d. per lb. on spot, lower prices in about ten days. Cheese, loaf, 10½d. per lb. Eggs, new laid, 1s. 2d. to 1s. 3½d. per doz.; country, 1s. to 1s. 1d. per doz. Potatoes, newly dug, 12s. to 18s. per cwt.; imported, £8 to £8 10s. per ton. Onions, 12s. 6d. per cwt. Chaff, prime, £5 15s. to £6 5s. per ton; medium, £4 to £4 15s. per ton. Bran, £8 per ton. Pollard, £8 per ton. Flour, £10 to £10 5s. per ton. Oilcake, £10 per ton. Oats, 3s. 8d. to 4s. per bushel. Wheat, truck lots, 3s. 10½d. to 4s. 1d. per bushel.

Fruit.—Oranges, navel, 7s. to 11s. per case; ordinary, 3s. 6d. to 5s. to 8s. per case. Lemons, 4s., 5s. 6d. to 8s. 6d. per case. Mandarins, 7s., 9s., 12s., to 16s. per case. Apples, Yates, 8s. 6d., 10s., to 13s. 6d. per case; Jonathans, 9s., 10s. 6d., to 14s. per case; Nickajacks, 8s., 9s. 6d., to 14s. per case; Cleopatras, 7s. 6d., 9s., 10s., to 13s. per case; Rome Beauties, 8s., 9s., 10s., 12s. 6d. per case; Five Crowns, 7s. to 9s. per case; Ben Davis, 7s., 8s. 6d., to 10s. per case; Rokewood, 7s., 8s. 6d., to 10s. per case; medium and inferior varieties, 3s. 6d., 4s. 9d., 5s. 6d., to 7s. per case. Pears, 15s. to 18s. per case, ex Cool Stores.

Vegetables.—Cabbage, 2s. 6d., 3s. 9d., 4s. 6d., to 7s. per cwt. Cauliflowers, 1s. 6d., 3s., 5s. 6d., to 11s. 6d. per doz. Beetroot, 1s. 4d. to 1s. 9d. per doz. bunches. Carrots, 1s. 6d. to 1s. 10d. per doz. bunches. Parsnips, 1s. 3d. to 1s. 9d. per doz. bunches. Turnips, white, 4d., 6d., 9d., to 1s. 2d. per doz. bunches; Swedes, 1s. 6d. to 1s. 8d. per doz. bunches, bulk lots, 5s. to 6s. 6d. per cwt. Peas, green, 5d. per lb. Marrows, 1s. 6d. to 2s. per doz. Pumpkins, I.B., 6s. to 7s. per cwt.; bugle, 4s. to 4s. 9d. per cwt. Rhubarb, 1½d. to 2½d. per lb. Chillies, 6d. per lb. Brussels Sprouts, 2d. to 3d. per lb.

Salads and Herbs.—Lettuce, 1s. to 2s. 3d. per bag. Spring Onions, 4d. per bundle. Celery, 6d., 9d., 1s., 1s. 6d., to 2s. 3d. per doz. heads. Cress, 9d. per doz. bundles. Radishes, 6d. per doz. bundles. Thyme, Majoram, Sage, 2s. per tray. Parsley, 3d. per bundle.

Poultry (for killing).—Young fleshy roosters, 5s. 6d. to 7s. 6d. per pair. Hens and aged roosters, 3s. 9d. to 5s. per pair. Chickens, 2s. 6d. to 3s. 9d. per pair. Ducks, from 5s. 6d., 6s. 6d., to 8s. 6d. per pair. Geese, worth 10s. per pair. Turkeys, gobblers, 16s. 6d. to 20s. per pair; hens, 8s. to 11s. per pair.

Carcase Meat.—Pork, medium weights, 6d. to 7d. per lb.; heavy weights, 4½d. to 5d. per lb. Veal, 4½d. to 6d. per lb.

Sundries.—Bonedust, £5 10s. to £6 12s. 6d. per ton. Phosphate, £4 10s. to £5 10s. per ton. Guano, £3 15s. to £4 5s. per ton. Ammonia, 20s. per cwt. Nitrate of Potash, 17s. per cwt. Kainit, £4 15s. per ton. Special orchard manure, £6 17s. 6d. per ton. Special potato manure, £6 17s. 6d. per ton.

GARDEN NOTES FOR SEPTEMBER.

By G. CHITTY BAKER.

Work may be considered to be now in full swing. September being well into spring, the weather is becoming warmer, plants grow quicker, winter crops are ready for harvesting, while seed of all kinds may be sown for summer use.

As the month advances and the weather becomes warmer, the advent of all kinds of insects will be found to be on the increase, which do a great amount of injury to all young plants. These pests may be divided into two kinds, leaf-eaters, such as caterpillars, grubs and beetles; and sap-suckers, such as aphides. For the first kind, spray with some preparation to which is added Paris green, and for the aphids, kerosene emulsion, tobacco wash, tar-water or quassia chips should be used.

Weeds also give considerable trouble at this time and require constant attention. They should always be pulled up and destroyed before seeding, otherwise they will give you more trouble by-and-by. It is a very old, and, at the same time, a very true saying, "That one year's seeding causes seven years' weeding."

All ground should be well and constantly worked, covering in all and any weeds or vegetable matter for the purpose of forming humus to retain the moisture for the plants in the coming dry weather.

Nearly all kinds of vegetables may be sown in the open this month, amongst which are the following:—Artichoke (both globe and Jerusalem); beet (round, long, and silver); beans, French and broad (only a small sowing of the latter); lima, tall and dwarf. Cabbage—plant out young seedlings, and sow a little more seed for summer. Carrots, celery, cucumber, egg-plant, lettuce, melons (both rock and water), onions, parsley, peas, pumpkins,

parsnips, radish, spinach, sweet corn, squash, tomato, turnip, and vegetable marrows may all be sown.

The ground should be well cultivated to keep down weeds.

CLIMBING AND TRAILING PLANTS AND THEIR TREATMENT.

Few gardens can be considered furnished without the introduction of some climbing or trailing plants to cover old tree stumps, to scramble over poles and rustic buildings, or to cover bare and unsightly walls.

The plants adaptable for these purposes are various, and it need hardly be said that all cannot possibly respond favourably to one and the same treatment; each subject requiring a special soil or some particular treatment in the way of feeding, trimming, thinning out of superfluous growths, etc.

The most important of all is perhaps the Virginian Creeper, or Ampelopsis, and the best of its varieties is *A. Veitchi*, or the "Self-clinging Virginian Creeper." This will thrive in any soil, and in any situation. Perhaps the next most popular subject is the Clematis, and its many varieties; these thrive best in a compost of light loam and peat, they are usually increased by cuttings taken from firm side shoots and placed under a handlight in summer, while most of the Jackmanii type are best multiplied by grafting on the common Clematis Vitalba.

The Ivy should take a third place. This delights in a deep, rich soil that is inclined to be light. Ivies are best propagated by means of layering, or by slips, which should be inserted on a north border in the autumn; the soil should be made sandy and kept moist.

Loniceras or Honeysuckles prefer good, loamy soil and a shady sheltered position, and are increased by layers put in in the autumn. *Jasmines may be propagated in the same way and are not particular as to soil, while the Passion Flower and Wistaria delight in a compost of loam and peat and are multiplied by means of layering well-ripened young shoots.

THE GARDEN.

In the flower garden, lawns and grass plots should be laid down. Flower seeds, selected according to taste and choice from the large number of varieties to be had from the nurseryman, should be sown. Plant chrysanthemums, hyacinths, candelabras, dahlias, lilliums, tuberoses, etc.

THE ROCKERY OR ROCK GARDEN.

A rockery in the garden is usually looked upon as one of the chief features, because it generally contains many choice and rare gems. Besides, it often serves to break the view of some unsightly corner or bare wall.

With only a small outlay a very pretty rockery can be made. Stones for making the structure are the first and chief item. They should be laid as though Nature had left them, and when this is complete the soil should be laid between them. Burnt bricks, sandstone, clinkers, or small pieces of rock should form the general outline. Where large stones are used they are best laid at the same time as the earthy base, which will keep them in position. It is astonishing how little stone is required if the rockery is outlined beforehand and properly constructed. Each piece of stone should be carefully posed and made to show itself in a rugged position, and to hold the lower

pieces firmly together cement may be employed. A rockery on a large scale must not be planted until the foundations are sufficiently settled. Smaller rockeries do not require time for settling, as a free ramming of the soil will set the whole into a solid mass, thus preventing the stone from sinking. Set the stones in such positions that the nooks and holes left for the plants will catch the rain.

As to soil it is absolutely necessary that it should be at least two feet in depth and in a suitable condition. Alpine plants and others usually grown on rockeries must have a sufficient depth of soil to ramify their roots in. It is well to bear this point in mind, as many think rock plants will grow with little soil, simply gaining their support from the rock. In hot and dry seasons, rock plants planted in an insufficient depth of soil dry up for the want of more root room. In their native habitats the roots run deep into the crevices of the rock, finding out the cool and moist places, where the hot sun cannot penetrate, and although the crest of the rock is heated and the tiny plants look almost at the point of withering, their roots below will support the plant in the severest drought.

With newly planted rockeries, frequent watering is essential in hot weather. The natural home of many rock plants is where a constant flow of water exists, so that their roots are ever moist. The plants should be carefully and frequently overhauled for slugs, snails, and other destructive pests, which are likely to abound in such places. If you desire your rockery to look well, do not plant it in a stiff and uniform style.

THE FARM.

Sow amber cane, sugar beet, Bokhara clover, broom corn, buckwheat, cabbage, grasses, kale, kohl rabi, lucerne, mangels, millets, pie-melon, mustard, pumpkins, rape, sorghum, sunflower, etc.

In hilly country sow cow grass, clovers, cocksfoot, fesene, and other grasses and trefoil. Wattle and other tree seeds and hedges can be sown. The silo should be made and fruit trees sprayed.

EDITORIAL REQUEST.

Correspondence and Queries are invited from subscribers and readers of the Journal on any subject of interest to agriculturists and other settlers on the land, either conveying useful information or seeking it. Suitable letters and contributions will be published and answers to queries given in the succeeding issue, if communications are received by the Editor not later than the fifteenth of each month.

Secretaries of Agricultural Associations, Societies, and Farmers' Clubs are kindly requested to supply corrections of the lists published in the Journal, such as changes of appointments, dates of shows and meetings, as well as any other items of interest.

Rainfall for the month of July, 1908, recorded at telegraphic stations in Western Australia, and averages.

STATIONS.	Total for July, 1908, in points, 100 points=in.	No. of wet days.	Average for July.	STATIONS.	Total for July, 1908, in points, 100 points=in.	No. of wet days.	Average for July.
TROPICS :				NORTH COOLGARDIE			
Wyndham ...	Nil	...	30	FIELDS :			
Turkey Creek ...	Nil	...	11	Sandstone ...	57	6	...
Hall's Creek ...	28	2	33	Wiluna ...	28	2	79
Fitzroy Crossing ...	42	1	39	Mt. Sir Samuel ...	60	3	105
Derby ...	86	3	19	Lawlers ...	57	3	74
Broome ...	60	3	26	Mt. Leonora ...	52	5	62
La Grange Bay ...	26	2	60	Mt. Malcolm ...	39	4	52
Wallal ...	10	1	76	Mt. Morgans ...	36	3	60
Condon ...	35	2	42	Laverton ...	57	3	72
Bamboo Creek ...	78	2	109	Murrin Murrin ...	33	3	64
Marble Bar ...	164	3	112	Yundamindera ...	38	4	77
Warrawoona ...	110	1	197	Kookynie ...	76	4	81
Nullagine ...	102	2	72	Niagara ...	51	3	66
Port Hedland ...	133	2	101	Menzies ...	87	5	72
Whim Creek ...	207	5	86	Mulline ...	57	4	114
Roebourne ...	185	4	88				
Cossack ...	231	4	77	COOLGARDIE GOLD-			
Fortescue ...	194	5	92	FIELDS :			
Onslow ...	165	5	111	Davyhurst ...	72	5	138
Winning Pool ...	73	3	168	Goongarrie ...	35	5	65
WEST COASTAL :				Broad Arrow ...	57	5	81
Carnarvon ...	24	3	193	Kurnalpi ...	39	4	66
Sharks Bay ...	65	6	145	Kanowna ...	44	6	82
Wooramel ...	41	4	165	Bulong ...	70	4	72
Hamelin Pool ...	75	5	167	Kalgoorlie ...	27	5	87
Northampton ...	324	5	404	Coolgardie ...	52	6	76
Mullewa ...	193	6	206	Burbanks ...	45	6	113
Geraldton ...	290	7	370	Widgemooltha ...	39	7	71
Greenough ...	276	6	364	Norseman ...	83	8	81
Dongarra ...	263	7	357	Boorabbin ...	89	5	104
Mingenew ...	251	7	319	Southern Cross ...	110	6	133
Carnamah ...	180	5	241				
Dandarragan ...	444	9	455	S.W. COASTAL :			
Mooro ...	353	9	356	Gingin ...	591	10	610
Walebing ...	332	10	309	Guildford ...	500	11	632
New Norcia ...	380	10	348	Perth Gardens ...	535	11	606
MURCHISON FIELDS :				Observatory ...	568	10	663
Peak Hill ...	48	6	93	Fremantle ...	393	13	578
Abbotts ...	32	2	82	Rottneet ...	454	13	565
Gabarintha ...	35	2	90	Rockingham ...	679	11	648
Nannine ...	42	2	70	Jarrahdale ...	763	10	749
Cue ...	96	4	102	Mandurah ...	744	13	636
Day Dawn ...	72	4	94	Pinjarrah ...	792	10	677
Lake Austin ...	84	4	95	Collie ...	635	11	651
Lennonville ...	56	5	102	Bunbury ...	509	12	675
Mt. Magnet ...	48	4	77	Donnybrook ...	721	12	656
Yalgoo ...	33	2	125	Busselton ...	692	13	561
Murgoo ...	48	5	116	Cape Naturaliste ...	666	16	...

RAINFALL—continued.

STATIONS.	Total for July, 1908, in points, 100 points=lin.	No. of wet days	Average for July.	STATIONS.	Total for July, 1908, in points, 100 points=lin.	No. of wet days.	Average for July.
S.W. COASTAL—continued.				S.W. INLAND—continued.			
Karridale ...	966	16	766	Broomehill ...	300	10	289
Cape Leeuwin ...	734	22	613	Kojonup ...	514	13	326
S.W. INLAND:				Greenbushes ...	570	13	611
Kellerberrin ...	165	5	188	Bridgetown ...	569	15	513
Meckering ...	264	4	254	SOUTH COASTAL:			
Newcastle ...	442	8	402	Mt. Barker ...	482	13	347
Northam ...	249	6	321	Albany ...	454	18	499
York ...	269	9	320	Breakson ...	453	21	396
Beverley ...	295	6	286	Bremer Bay ...	473	18	292
Wandering ...	460	9	394	Hopetoun ...	318	15	292
Pingelly ...	278	7	318	Ravensthorpe ...	164	12	208
Narrogin ...	380	9	317	Esperance ...	283	15	368
Marradong ...	705	9	507	Israelite Bay ...	191	13	140
Williams ...	347	9	358	Balladonia ...	60	7	72
Arthur ...	364	7	305	Eyre ...	79	11	115
Wagin ...	315	8	273	Eucala ...	...	...	...
Katanning ...	322	11	273				

REMARKS ON THE RAINFALL FOR JULY, 1908.

The rainfall has been above the average in the West Kimberley district, the majority of stations in the N.W. division, and over the S.W. from Rockingham and Meckering southwards. Elsewhere, with the exception of Walebing, New Norcia, Menzies, Norseman and Israelite Bay, it has been below the average.

Most of the rain which was recorded in the Tropics resulted from the monsoonal disturbance which affected that portion of the State during the last week of the month, the excess in the Kimberley ranging from 3 points at Fitzroy Crossing to 67 at Derby, and in the N.W. division from 30 points at Nullagine to 154 at Cossack, whilst the excess in the S.W. ranges from 10 points at Meckering to 200 at Karridale. Practically the whole of the rain in this district was recorded between the 1st and 10th, and the 17th and 20th.

The greatest decrease is shown at Carnarvon, viz., 169 points.

E. B. CURLEWIS,
Divisional Officer for W.A.



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1908.

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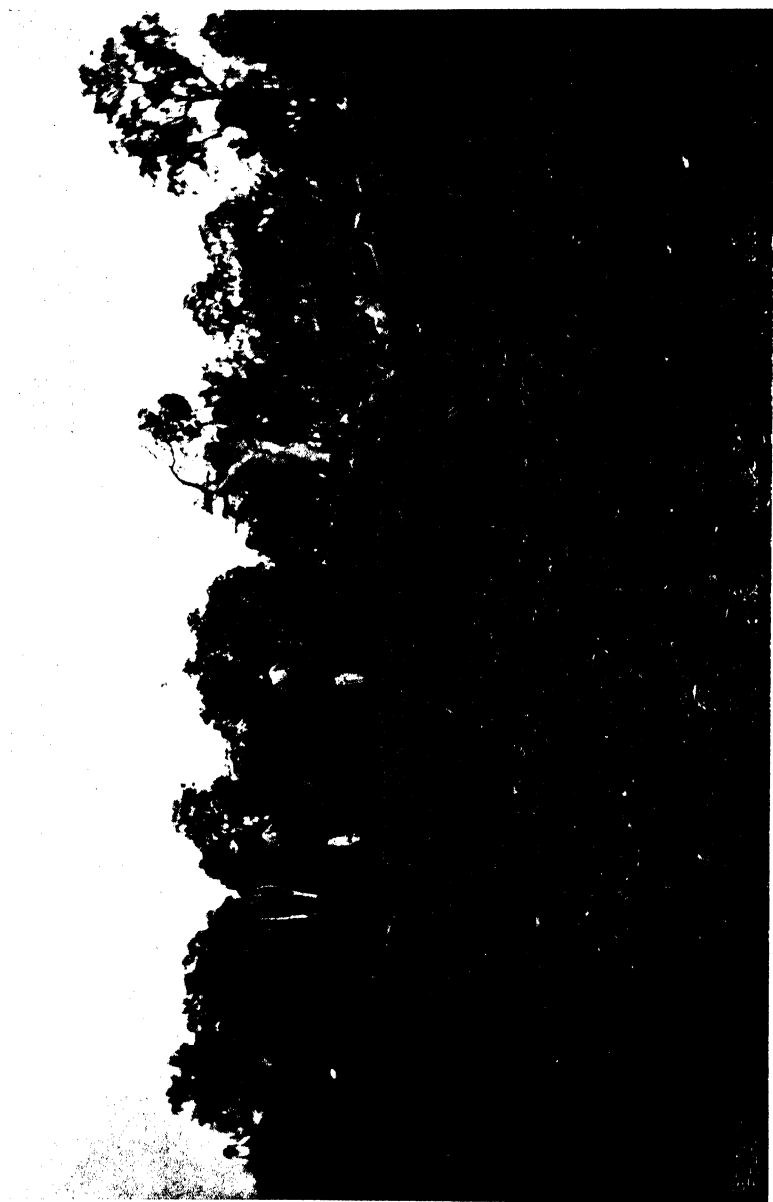
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NOTES.

Ewe with Five Lambs.—On the farm of Mr. H. Rogasch, near Rainbow, Victoria, a ewe recently gave birth to five lambs. Mother and progeny all died.

Vegetation Diseases Acts of Victoria.—The Victorian Minister of Agriculture has caused to be proclaimed in the *Gazette* of that State the following declared diseases under "The Vegetation Diseases Acts, 1896 and 1901," of Victoria:—*Armillaria mellea* (Root Rot), *Claviceps purpurea* (Ergot), and *Cylus formicarius* (Sweet Potato Weevil).

Country Shows.—We are in receipt of the official schedules of prizes for the annual shows to be held, respectively, at Northam on September 29 and 30, York on October 6 and 7, and Kelmseott, October 26. The prize list for Northam amounts to £500. Entries for the York Show close with the Secretary on 25th inst.; Kelmseott entries close at latest on October 24.

New Home for the Jersey.—While British dairy farmers are neglecting the Jersey because (says *Live Stock Journal*) it has no pretensions to being a great producer of beef, others are recognising its value as a special purpose cow. The Danes have discovered that no other breed can touch it where butter is the object in view, and Danish farmers when they learn something worth knowing are not slow to take advantage of their knowledge.

Co-operative Bacon Factories.—Following the example of the successful establishment of the co-operative bacon factory in Roscrea, Tipperary (a description of which appeared in the *August Journal*), capital has been subscribed in Essex, England, for a similar undertaking in that county. This is, probably, the beginning of a movement in that direction which will extend over the three Kingdoms.

The Banana Apple.—A new variety of apple, called the "Banana Apple," is spoken of very highly in America, and is said to have realised very high prices. It is claimed to be one of the best of all apples in quality. It is also a beautiful apple, looking like lumps of gold tinged with red on one side. The fruit is large and uniformly fair and free from worm. The tree is a good bearer and fast grower. It is a long-keeping winter apple. It is reported to have realised 12 dollars per box in Oregon district last year.

A Cage for Bee Swarms.—A splendid thing to stop robbing and to catch swarms is a little wire cage just large enough to be set down over the largest hive and leave six or eight inches clearance around the hive and on top. If one discovers a swarm just coming out, he can clap the cage right over the hive and catch nearly the entire swarm. The whole cage may then be picked up and the bees dumped in front of the hive that has been prepared for them. During the robbing season such a cage is invaluable.—*Gleanings*.

West Australian Flour.—Mr. Padbury, of Guildford, states that since placing "Peerless" flour on the market the demand has been very great and the number of repeat orders is simply surprising. This gratifying fact shows that flour of the best West Australian grain, made by up-to-date methods, is sure to meet with the approval of local consumers. The "Peerless" Flour Mill is worked continuously at top speed to keep pace with incoming orders.

Army and Navy Contracts.—The Imperial Supplies and Transport Department at Malta is calling for tenders for the supply of fresh meat and live cattle to the Naval and Military Forces at that station, for the period of 12 months from January, 1909. Tenders in duplicate should reach the office of the Assistant Director of Supplies and Transport, Valetta, Malta, by 2nd November, 1908. Copies of the forms of tender can be seen at this Department, St. George's Terrace.

Wool trade with China.—*The Pastoralists' Review* says a new and noteworthy feature in connection with the wool business was the fulfilment in Sydney last month of an order for some wool for China. It is hoped that this initial order will lead to the development of an important trade in a new direction. Japan is now a regular customer for Australian wool, and it is probably only a question of time when China will adopt Western methods, and by fostering the woollen and worsted industries make an effort to secure a share of the trade in the Far East in these and other manufactured goods.

Brown Scale Parasites.—By the R.M.S. "Orontes" the Department received from Mr. G. Compere, then at Colombo, a package containing material from which to breed two species of parasites of soft brown scale. One species was from Italy and the other from Port Said, the former being, in Mr. Compere's opinion, the better of the two. When in Germany, Mr. Compere forwarded a package containing aphid-feeding ladybirds, which was to be placed on the mail steamer at Naples, but it has not yet come to hand. The brown scale parasite material has been placed in a breeding case at the Department's insectarium.

Gypsum at Hine's Hill.—In January last a report was received from Mr. John Robinson, of this Department, on the gypsum deposits at Hine's Hill, which are situated about one mile to the north of the railway station. The report stated that there is a large quantity of the mineral to be found spread over an extensive area in the locality, and generally of a uniform quality, suitable for agricultural purposes or plaster of Paris work. At the request of the Department, the Minister for Lands has authorised the withdrawal of the land from selection and set aside as a reserve.

Poor-conditioned Stock at Wagin.—Mr. R. E. Weir, Chief Inspector of Stock, recently inspected a number of cattle at Wagin, the property of Mr. C. Davey, about twenty in number. They exhibited symptoms of lameness and general stiffness in movements; with want of development in the young stock. Mr. Weir ascribed their complaint to disease condition of the bone due to malnutrition and lack of lime salts in the food supply, and is a trouble to which stock in that particular district will always be subject until the soil is improved with phosphates. The addition of a small quantity of bone meal in the daily food supply was recommended.

Extermination of Mosquitoes.—In many countries troubled with mosquitoes various efforts are made to reduce the pest and the danger they create of carrying disease germs to human beings, by means of drainage and covering stagnant pools and swamps with a layer of oil. In Hawaii the mosquito plague is very severe, and the top-bunnows of the *Pocillidae* family were introduced in 1905 from Seabrook, Galveston, U.S.A., to feed upon the mosquitoes. They have proved a great success, and have been distributed to all the other islands of the group. The little fish now swarm in the localities where they have been liberated, and supplies can be easily obtained from the Hawaii Agricultural Department.

Revival of West Indies Cotton Industry.—In a progress report, Mr. W. W. Froggart, New South Wales entomologist, who recently visited the West Indies, says:—"The revival of the cotton industry in the West Indies has been one of the most important events of the last few years, and the total area now under cultivation is over 24,000 acres, chiefly in the islands of St. Vincent, Montserrat, Nevis, Antigua, and Barbados. On the latter, 6,935 acres are under cotton, the value of the crop being estimated at £120,000. There is a co-operative cotton ginning-mill in Bridgetown which was completed last year, and it is said to be the largest sea island cotton mill in the world. Sea island cotton is a very profitable crop, bringing up to 2s. 6d. per lb., one lot from St. Vincent bringing as high as 2s. 8d. per lb."

Green Manuring.—Green manuring is effective on both sandy and heavy clay soils and, indeed, in all soils deficient in humus. On sandy soil its effect is to consolidate the soil, and in clay soils it acts by loosening the texture and letting the air act on it. When conditions as to warmth and moisture are favourable, the green crop decomposes without much delay, and the production of soluble plant food proceeds with considerable rapidity. This is especially the case with the valuable nitrogenous portion of the green stuff. Nitrification, that is the conversion of the nitrogenous material of the plant into soluble nitrates, takes place quickly. In sandy soils green manure niti-

fies more quickly than ordinary organic manures, such as bonedust, ground horns, dried blood, etc., while in stiff clay soils it nitrifies more rapidly than even sulphate of ammonia or animal manures.—*Mark Lane Express*.

The Blow-fly.—Dr. A. A. Brown, bacteriologist of the Victorian Department of Agriculture, writes:—"There are two distinct varieties of the blow-fly, both equally destructive. One is the *Calliphora villosa*, having a yellow, hairy body, in shape resembling a blow-fly; and the *Calliphora oceanica*, which has a blue body, with yellow margins. The fly commences active operations in force in early spring, and continues till the autumn. In the winter it makes intermittent attacks when the weather becomes bright or moderately warm for a few days. Not only does the fly exist in greater force than before, but it is more vicious in its attacks upon the sheep in recent years in consequence of the insects of the drought period having acquired a more pronounced taste for the living animal, and handed this appetite down in gradually-increasing degree to their progeny.

Australian-made Sacks and Bags.—The enterprising firm of Messrs. Joyce Bros., Limited, of Cantonment street, Fremantle, supply important wants in the industrial life of Australia, namely, locally manufactured bags and sacks of all descriptions. By means of a power-driven plant the firm are making chaff bags of various qualities; phosphate, salt, and grain bags; meat export bags, the requirements of which they thoroughly understand, besides smaller bags of hessian, canvas, or calico. In addition to those mentioned above, Messrs. Joyce Bros. turn out mining bags, and canvas or jute ore bags; in fact, as they claim, anything in the same line from bird-seed bags to meat wraps. They undertake to print any design on the bags. This firm have branch factories at Sydney, Brisbane, Dunedin, Auckland, and buying houses in London and Calcutta.

The Caterpillar nuisance at Beverley.—In connection with the incursion of caterpillars in certain parts of the Beverley district and the steps taken to abate it, Mr. J. S. W. Parker reports that harrowing and rolling the ground in the course of the inroads of the pest have had the effect of preventing the grubs from spreading. At the suggestion of the Minister for Agriculture, farmers in the affected localities harrowed and rolled their crops. In Mr. Minchin's farm it was found that it was more effective to roll the fields the day after zig-zag harrowing, as the grubs took shelter under the clods of earth, and the pressure of the roller killed them out. The result was that great quantities of the grub were crushed, and later the growing crops sprang back and recovered their appearance. Mr. Minchin also opened a trench ahead of the advancing pests, with perpendicular sides, a quarter of a mile long and one foot deep. The cut-worms fell into the trench, where they were shovelled up and destroyed by the cwt. Good results have also followed on other farms.

AGRICULTURAL CONFERENCE.

SECOND ANNUAL MEETING.

The Second Annual Conference of Agriculturists of this State was opened at noon by His Excellency Sir Frederick Bedford, G.C.B., in the Town Hall, on August 26, in the presence of a large number of visitors. Delegates representing upwards of sixty-four societies attended, Mr. A. R. Richardson presiding.

Before requesting the Governor to declare the Conference open, the Premier, Hon. N. J. Moore, referred to the agricultural industry, on the success of which the future of Western Australia largely depended. Everything in connection with land and agriculture was on the increase. So far as land settlement was concerned, last year they had no less than 4,500 different settlers, and some 700,000 acres were alienated under first-class conditions. Another pleasing feature was that no less than 611,000 acres were either cleared or partially cleared during the same period. That was an emphatic reply to those who said that under the conditions of alienation at the present time improvements were not being effected to the extent that they should be. The provisions for progressive improvements meant that within 10 years the selector had to spend on improvements an amount equal to the value of his land, whereas under the old conditions it was practically possible for one individual to hold a large area for 10 years by simply putting a ring-fence around it. Dealing with the question of agriculture, he said they could show that the area under crop had increased to 460,845 acres, as against 364,704 acres last year, which was equal to an increase of 26 per cent. (Applause.) The total area of arable and partially cleared land this year was 3,164,035 acres, as against 2,152,938 acres last year, or an increase of over one million acres. Possibly it would look as if there was some discrepancy in the figures he had quoted, but there were 700,000 acres alienated under first-class conditions, and the balance of 300,000 acres of land was alienated under what was known as the old grazing lease system, and which probably was ringbarked. It was not possible to get quite correct figures relating to the wheat area under cultivation. Last year the area was 280,000 acres, and the Agricultural Department was satisfied that the next return would show a large increase. Last year the wheat exported amounted in value to about £100,000, and the pleasing feature about it, so far as the producer was concerned, was that he was able to practically receive London prices, less the cost of railage, freight, and other incidental charges. They were all aware of what had been done in the way of railway construction in the South-West district. The South-West division extended from a few miles north of Geraldton to Albany, and a point on the goldfields line somewhere beyond Doodlakine was the eastern boundary. In those agricultural areas 207 miles of railway were constructed and 74 miles were in course of construction, while the Government had purchased the Denmark and the Jarrahwood lines, which accounted for another 45 miles. With a magnificent climate, absence of drought, and an assured rainfall, those lines would tend to a great transformation so far as the South-West was concerned. The summary of

transactions of the Agricultural Bank provided further evidence of development, and they were fortunate in having at the head of that institution a gentleman like Mr. Paterson, who was well seized with the possibilities of the State, a careful business man, and a man of practical farming experience. He trusted that as a result of his trip Mr. Paterson would return benefitted in health, and they knew that the experience which he gained while away would be of value to the State which he so worthily served. The Premier also spoke hopefully of the future of the mining and timber industries, and in concluding expressed pleasure that His Excellency was amongst them to declare the Conference open.

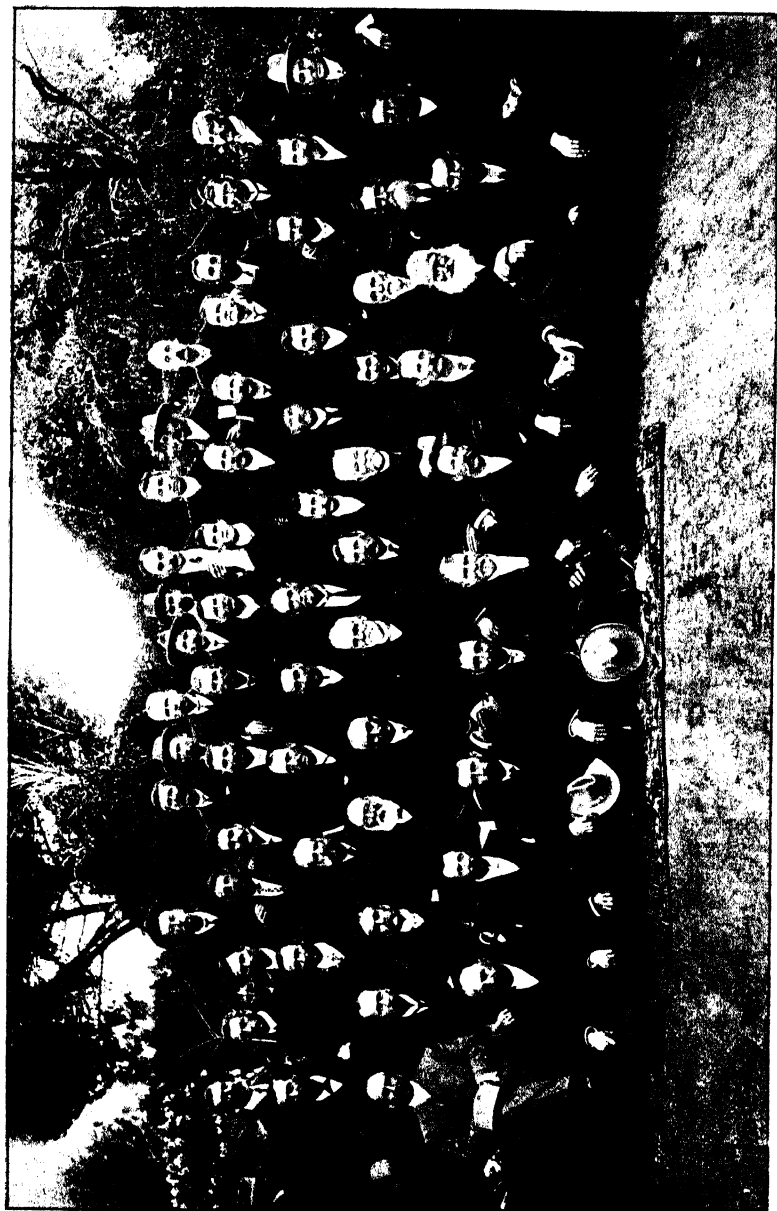
His Excellency, in rising to declare the Conference open, was greeted with prolonged applause. He said that after the interesting speech they had heard from the Premier it was hardly necessary for him to say much. At the same time he could not help expressing the delight he felt at seeing each year that he had been in the State the rapid growth of the pastoral and agricultural industries, which he felt were now placed upon a firm basis, and also at seeing the State looked up to now not only as a place which produced abundant gold and other minerals, but which produced wheat and wool and things of that sort, and which would, it was hoped, go on doing so in ever-increasing quantities each year. He had great pleasure in declaring the Conference formally opened.

The Hon. James Mitchell, Minister of Agriculture, proposed a vote of thanks to His Excellency. In doing so he said that there were present that day representatives from every agricultural centre in the State. The Conference met to consider the various matters within their province which might be of importance to the State. There was no time in its history when it was more necessary than just now for agriculturists to come together in this way. Foremost amongst the matters to be considered would be the question of dealing with those products the supply of which exceeded the local demand. Of these cattle and sheep were yearly increasing in numbers, and they had to find a market for their lambs, and cereals and fruit required attention if we were to make them profitable. Many other matters of vital importance to the farmer and pastoralist would also be discussed, and it was hoped that the deliberations of the Conference would be such as to be of great assistance in the development of the magnificent resources of the State. His Excellency had always shown his interest in all matters connected with the welfare of the State, and he asked the Conference to accord him a hearty vote of thanks for his presence that day.

The motion, seconded by the President, was carried with acclamation.

In returning thanks, His Excellency said his only regret since his stay in the State had been that, being a sailor, he had not known enough about cows and sheep and so forth. (Laughter.) In his travels about the country he had learnt what he could to make up for the deficiency. He referred to the manner in which the magnificent trees were being destroyed on some of the holdings, and thought that everyone clearing a large tract of country should, if possible, leave a few upstanding. He was looking forward to a trip around the agricultural districts next week to Busselton, York, Beverley, Newcastle, and other places, and after his return from the Eastern States in October he hoped to pay a visit to the Katanning district. (Applause.)

The Conference then adjourned till 2.30 in the lecture-room of the Agricultural Department.



Agricultural Conference: Group of Delegates.

AFTERNOON SESSION.

Mr. A. R. Richardson presided at the afternoon session, held in the lecture-room of the Agricultural Department, at which seventy-five delegates were present.

The Minister for Agriculture said there were delegates present from every agricultural centre, and they should be able to do something of lasting value. The man in the street to-day was talking agriculture, so it would be seen that the producers had assumed a more important position in the eyes of the people than was the case a few years ago. This was as it should be, because it was land settlement that would make this country. The goldfields were marvellous, but after 10 years they had only 260,000 people. Ten years of successful land settlement would, he believed, make the State the home of twice 260,000 people. It seemed to him that the land settlement during the past two years had worked much good already. The people who a couple of years ago were despondent to-day were much more cheerful. The delegates to the Conference were wanted to help push on this work. The extent of the settler's usefulness to the country was the limit of his production, and it was the duty of everyone of them to make the people produce to the fullest possible extent. The new scheme of survey before selection would save a great deal of inconvenience, and it would be admitted that the provision that the trustees of the Agricultural Bank should have full responsibility in respect to the appointment of inspectors was a wise one. Under the new arrangement there would be none of those delays which in the past had been found to be so hurtful to settlement and development. The country would not be opened up by rich men, and the Government would have to help the men they had—men of muscle, determination, and intelligence. He quoted the summary of the transactions of the Agricultural Bank, and stated that if the producers wanted more money than the present capital of £1,500,000 it would be provided. The Government had set the ball rolling, and it could not be stopped. Last year he had stated that they should have a harvest of 4,000,000 bushels, but owing to the late frosts they only realised 3,000,000. This year they did not anticipate the same trouble, and they would probably have to export. He was not in sympathy with State trading, but it would be necessary for the Government to see that fair trading conditions applied. Some of the mills had a good deal of wheat on hand, and some arrangement would have to be made for export this year, because with a good season there would be a tremendous lot for export. This was a question which he hoped would have the consideration of the Conference. The time had come when in connection with their wheat, their fruit to some extent, and certainly in connection with their lambs, they had to face the world's markets, and something would have to be done to provide facilities for doing so. If the harvest should be what he anticipated, there would be some millions of bushels of wheat produced. Some of it, of course could be consumed in the State, but there would be a lot over, and speculators would not be so anxious to take the crops unless they saw some chance for export. The Government would continue the system of giving advances against wheat stored if the farmers liked to take advantage of the offer, but the question of the export trade was one upon which he would like them to express an opinion. The local consumption of lambs accounted for about 10 per cent. of those produced. About half-a-million lambs were bred in the State, and they would have to face the question of export. There was no reason why they should not breed just what the London

market required. There would be considerable trouble unless they got a bigger market for the lambs, and that could only be gained by increased facilities for export. The Government had made an effort to bring about a bigger production of butter, but the State was still importing about £1,000 worth a day. Some little difficulty was being experienced by the owners of dairy cattle, but it would be straightened, and the industry here would flourish as it was doing in the Eastern States. He did not know of a district that was better favoured for butter-making than the south-western portion of the State. The Government had established a State farm at Brunswick, and he extended to all interested farmers an invitation to visit the place. The State farms had all been put on a commercial basis. Most of those present had seen them, and he would like them to criticise the work of the Government in that direction. In fact, in all matters agricultural that came up for consideration he trusted the delegates would express their opinions, whether they were favourable to the Government or not, with perfect freedom. The official Year Book of the Commonwealth showed that Western Australia was the only one of the States that had since 1901 made a decent percentage advance in cattle. The State now had $3\frac{1}{2}$ times as many cattle as were here 15 years ago. There had also been a good increase in the number of sheep, and it was very necessary that they should provide facilities for dealing with those increases. In conclusion, he repeated his desire that the Conference should deal with the various questions with the utmost freedom, because they were the men that the Government wanted to assist to do still bigger things in the future.

Several interesting papers were read, which will be found attached in sequence in succeeding pages.

SECOND DAY.

There was a large attendance at the morning session on the following day, when several useful papers were read and discussed.

Fruitgrowers' Considerations.

At the afternoon session a discussion took place on questions affecting the interests of fruitgrowers. A suggested resolution was forwarded by the Central Fruitgrowers' Association of Western Australia that, with a view to encourage the use of local timbers for fruit cases, and to minimise handling and risk of damage, the Conference should recommend that a uniform rate for cases of standard sizes be adopted on the railways.

Delegates were agreed as to the advisableness of adopting a uniform case, and the opinion was expressed that if the resolution could be given effect to without in any way prejudicing the work of the Railway Department, it would do an immense amount of good for the fruitgrowers throughout the State. It would save much jostling and handling at the different stations. A fair standard would be about 42lb.

The resolution was adopted on the motion of Mr. Duce (Wellington).

The Fruitgrowers' Association also suggested that the following standard sizes for fruit cases be adopted:—For flat cases, the Swedish flat case; for bushel cases, the Victorian standard bushel case, the dimensions under the Commerce Act Regulations being 20in. by 15in. by 10in. for a bushel of 48lbs.

Mr. M. H. Jacoby stated that the Swedish flat case was designed for the local market, and if it was adopted it would do away with the complaint of

buyers that some cases contained less fruit than others. The Victorian bushel case was intended for the export trade. It had been adopted in Victoria and Tasmania, and was generally recognised to be most suitable for the purpose. He moved that the resolution be adopted.

Mr. W. Reid (Nelson) seconded the motion, which was agreed to.

Another resolution was that the Conference should urge the Government to establish experimental orchards.

Mr. Jacoby said this was an old agitation. The question had cropped up year after year, but nothing had been done. The Government would not need to go to much expense, for he believed fruitgrowers in different parts of the State would be prepared to place portions of their orchards at the disposal of the Government, wherein the experiments could be conducted. He moved that the resolution be agreed to.

Mr. Reid seconded the motion and agreed that it would not necessarily entail any great amount of expenditure. The experiments in one district might not be much good to the growers in another part of the State, and it would be of great benefit to an intending settler if he had such a place to go to where he could get practical information with respect to what a particular part was adapted for.

Mr. Duce opposed the motion and thought that the fruitgrowers were well able to carry out their own experiments.

Mr. James (Armadale) thought that experiments might show that thousands of acres on the west side of the railway between Perth and Bunbury could be utilised for fruit-growing and other things. He was not in favour of the Government spending a lot of money in this direction, but he thought they might do something such as subsidising the Roads Board to experiment.

Mr. A. N. Piesse (Toodyay), who opposed the resolution, said that the orchards to do much good would have to be established within about 20 miles of each other, because what would suit one man would not suit his neighbour.

Mr. Sharp thought that experimental farms could be carried to a degree of absurdity. The pioneers of the fruit-growing industry in the South-West were the best authorities of what the district was capable of producing.

Mr. Jacoby, in reply, stated that if each individual fruitgrower was going to do his own testing, it would take seven or eight years before he would do any good. It would be far better if the energy thus dissipated was concentrated in one or two centres. New fruits could be tested, and they would have recommendations made as to the new fruits that could be planted with safety. The resolution was backed by the Fruitgrowers' Association, and it was sent forward with the honest belief that it would result in much good to the State.

The resolution was negatived.

The Fruitgrowers' Association further recommended that a resolution be passed affirming the principle that the parasitic method of fighting insect pests was of practical value, and that the Government should instruct Mr. Compere to use every effort to secure an efficient parasite for the woolly aphis.

Mr. Duce, who moved that the resolution be adopted, thought it should be agreed to if it was only in recognition of the work which the Department was doing, especially in view of the amount of "mud" that had been thrown

at Mr. Comperé by the so-called experts on the other side. He knew the efficacy of the parasites, and would defy anyone to find a live scale amongst his citrus trees.

Mr. Reid seconded the resolution, and said that the growers in his district had the utmost confidence in the work that Mr. Comperé was doing.

Mr. Sharp supported the motion, which was carried.

Markets for Surplus Products.

The Chairman said that the Minister for Agriculture was very anxious to get an expression of opinion from the Conference on the question of opening up a way to reach the markets of the world for surplus products such as wheat, fruit, fat lambs, mutton, and beef. They would shortly be faced with large surpluses, especially in lambs, and a serious problem would stare them in the face.

Mr. W. Burges (York) moved the following resolution:—"That this Conference desires to express approval of the steps and efforts made hitherto by the Government to open up markets for all surplus products of our agricultural and pastoral lands, whether of wheat, fruit, mutton, beef, or lambs, and desire that should they see fit to greatly extend their policy in this direction, and to cause such shipping arrangements to be made, coupled with cold storage, public abattoirs, as the situation demands, and the Conference has confidence that any such arrangement entered into will be in the best interests of the producers of the State in marketing their surplus products."

Mr. Padbury, who seconded the motion, said that the difficulty after getting the stuff away would be to find a market, and he suggested that it would be necessary to have direct representation abroad.

Mr. Wilding, M.L.C., considered that the Government should be congratulated on the work they had done for the producers. They knew that of the large supplies of stock in the Nor-West a very small proportion came to the southern market, most went to Queensland and elsewhere. Would it not be better to have freezing works up there, so that the trade would be facilitated? The Government had been subjected to a good deal of criticism with regard to the proposed freezing works at Wyndham, but he thought that they as producers should agree that they were doing the right thing.

Mr. W. Ball (Great Southern) strongly objected to the free advance of £35,000 by the Government to people who could throw away thousands of pounds on racehorses.

The Chairman: We are simply affirming the broad principle that the Government should exercise their ingenuity in finding markets in foreign lands.

The resolution was carried with enthusiasm.

Export of Wheat.

Mr. S. Williams (Beverley) moved that in view of a probable surplus of wheat during the coming season the Government be requested to arrange for exportation, making advances thereon. He thought unless something was done in this direction, the farmers would be faced with an over-supplied market, and prices would be very low.

Mr. S. H. Edwards (Pingelly) seconded the motion.

Mr. S. Haddy (Geraldton) thought it was a matter for the farmers to attend to themselves. In Victoria they had formed a co-operative society, and had done their own shipping with satisfactory results.

Mr. W. Padbury deprecated the tendency to run to the Government for every little assistance they wanted. They should be more self-reliant in the matter of the disposal of their products.

Mr. Burges agreed that they did not want so much spoon-feeding. Cheap railway rates and accommodation at Fremantle were about all they required.

The motion was negatived.

Poison Plants.

Mr. S. H. Edwards (Pingelly-Mourambine) moved that the Government should assist and authorise road boards to clear poison plants from public roads.

Mr. S. Williams seconded the resolution, which was carried.

Purchase of Machinery.

The Pingelly-Mourambine delegates submitted a resolution that the Agricultural Bank should assist farmers on the same lines as the present method of assisting for clearing, etc., to secure machinery on three years' terms.

The Chairman explained that the Agricultural Bank could not accept any machinery as security. The security must be in the land or in the improvements on the land. To extend their operations to help the farmers to purchase machinery on three years' terms in the same way as stock were purchased would require a little amendment of the Act, and possibly something could be done in that direction.

Mr. Kent, in a vigorous address, spoke of the difficulties which the agriculturist had in dealing with implement agents. He declared that the machinery octopus was much worse for the farmers than the meat octopus was for the consumers of beef and mutton.

The resolution was agreed to.

Central Board of Health and Dairy Herds.

Mr. S. Dvoretzky (Armada) moved—"That in the opinion of the Conference it is desirable that the Agricultural Department should at once move to take over the control of the dairy herds and farms from the Central Board of Health." He stated that the Central Board of Health was like the Russian Government, and was simply ruining the dairy industry. At present it was easier to make money in any other industry in this State.

Mr. Wilding, M.L.C., seconded the motion, which was carried.

Softwood Timber Trees.

It was resolved, on the motion of Mr. H. Hamersley, that the Government be asked to devise a method by which inducements could be given to landholders to plant softwood timber trees.

Wild Dogs.

Mr. G. E. Sewell (Greenough) moved—"That in the opinion of this Conference the bonus for the destruction of wild dogs should be increased, and that the administration of the Act should be placed in the hands of the roads boards; also that the tax on tame dogs, especially on sluts, be increased."

Mr. A. Thurkle (Irwin) seconded the resolution, which, after a brief discussion, was agreed to.

Spraying Materials.

It was resolved, on the motion of Mr. W. Mottram (Nelson), "That in the opinion of the Conference, the present freight rates on spraying materials are excessive, and that the Government should be urged to reduce them."

COMPLIMENTARY DINNER.

The delegates were entertained at a dinner given by the Hon. Minister for Agriculture (Mr. J. Mitchell). The guests included Messrs. McLarty, Kingsmill, Pennefather, Connor, and Wilding, Ms.L.C., the Mayor of Perth (Mr. T. G. Molloy), and Messrs. Theo. Lowe and J. M. Hopkins.

The loyal toast having been honoured, the Mayor proposed the toast of "The Ministry and Parliament." He said they would all give the Government credit for the good work they had performed during their term of office. The present Government had given an impetus to land settlement greater than had ever before obtained. The Government had been adversely criticised of late, but it was easy for those who had no responsibilities to complain. When they remembered the difficulties the Government had had to surmount, they must recognise that they had done good work. The prejudice which had formerly existed in regard to the capabilities of Western Australian soil had been removed, owing to the good service done by the Minister, Mr. Ranford, and other officers of the Government. They had evidence there that night of the many new settlers who had come into the State through the wise administration of the present Government. He paid tribute to the good service performed by Mr. Wilson as Treasurer. No person had been more zealous than the present Minister for Agriculture in working for the development of the agricultural industry. So far as Parliament was concerned, he believed the members of both Houses of the Legislature were, according to their honest opinions, doing their best for the State.

The Minister apologised for the absence of the Premier and other members of the Ministry. He said the members of the Government all recognised that that was one of the important gatherings of the year at which they should if possible be present. Naturally Ministers were desirous of doing the best they possibly could for the benefit of the State. No other Ministry had ever taken over the control of the affairs of the State at a more unfavourable time than had the present Ministry. The Ministry recognised the difficulties they had to face, but they also recognised that the resources of the State were such that would enable them by a vigorous policy to change the stagnation which then existed into prosperity. They had adopted that vigorous policy with the result that he believed they were now nearing a time when the depression would be entirely forgotten, and that in the near future they would enter into an era of prosperity such as had never before existed in the State. He claimed that the Government had done their duty. It was true that, as the Mayor had said, a prejudice had formerly existed regarding the capabilities of Western Australian soil, but the action of the Government had caused that

prejudice to entirely disappear, and the people in the other States now realised the wealth this State possessed in its broad acres. The Government were desirous of not only developing the agricultural industry, but every industry in the State. They recognised that the agricultural implements used in the State should be manufactured in the State, and intended doing all possible to bring that about. He believed that there was no better investment to-day than investment in the lands of the State. There was land for everyone at present at a very cheap rate, and if the people did not take advantage of the present opportunities for securing land they would in the future regret not having done so.

Mr. W. Kingsmill, M.L.C., referring to the recent criticism passed on the Legislative Council, said that it was seldom indeed that such criticism proceeded from those who sought to represent agricultural districts. In concluding his speech, he spoke in eulogistic terms of the work of the Minister for Agriculture and the officers of his department.

Mr. J. M. Hopkins proposed the toast of "The Agricultural Industry." He said that he was particularly impressed on reading the discussion which had taken place at the Agricultural Conference on the problems which agriculturists had to face with the fact that the annual reunion of representatives of those engaged in the agricultural industry in all parts of the State must result in incalculable benefit. He commended the action of the Government in building agricultural railways. It was only by such means that the out-back country would be developed as it should be. Every successive Government had devoted their attention to developing the South-West portion of the State. The one requirement of the State was the expenditure of £100,000 annually in the survey and classification of every portion of the State. He believed that if a policy of that description was adopted it would lead to a very large increase in the settlement of people on the lands of the State.

Messrs. T. Wilding, M.L.C., R. Gale, and J. Duce responded.

Mr. R. W. Pennefather, M.L.C., proposed "The Pastoral Industry." He congratulated the Government on having paid more attention to the needs of the North-West than had many previous Governments. That portion of the State had suffered very much in the past from want of shipping facilities, but that had been remedied to a great extent by the present Ministry. The North-West, however, still required more attention than it had received in the past. They frequently heard hard things said against the pastoralists, but he for one felt a great respect for the pioneers who had ventured out into the distant portions of the State. If any of them had by their own industry and perseverance gained a competence was he generous who begrudged them it? The Premier had promised him that after the next session of Parliament he and some of his Ministers and as many members of Parliament as cared to accompany them would visit the North-West. He was sure such a visit would result in the needs and capabilities of that portion of the State being better realised than they were at present.

The toast was responded to by Messrs. McLarty and Connor, M's.L.C., and Mr. G. A. Sewell.

Other toasts honoured were "The Financial Institutions," proposed by Mr. W. Padbury, and responded to by Mr. A. Christie; and "The Chairman," proposed by Mr. H. E. Hamersley, and responded to by Mr. Mitchell.

The following Papers were read at the Conference:—

FARMERS' SHEEP AND THEIR MANAGEMENT.

By H. W. HANCOCK.

Owing to the great development of our agricultural lands, together with the splendid progressive policy of the Moore Government, the sheep must soon play a most important part in the life of the West Australian farmer.

Leaving that most valuable breed, the Merino, to the pastoralists and large flock owners, I propose to confine my remarks to what might be termed the British breeds and their crosses, and for my purpose I will divide them into two classes, viz., long wools which include Lincolns, Leicesters, Romney Marsh and Cottswolds, while the short wools are Southdowns, Hampshire Downs, Oxford Downs, Shropshires, Suffolk Downs, and Dorset Horns.

These that I have mentioned are, of course, some of the most important, and I think may be safely used in building up the farmer's flocks of this great country.

The ewe most suitable for the farmer to start with so that he will not lose any time is, to my mind, a three-quarter bred Lincoln ewe, an ideal animal to begin with. She will for ever keep up the staple of the wool of the offspring that is to follow. Failing to obtain this ewe, a Leicester or Romney Marsh ewe is the next best.

Any ewe that has thin rabbit ears, scraggy neck, or narrow shoulders, should be condemned for breeding, as these are sure signs of a weak constitution which would surely be transmitted to the offspring. Having secured the ewes as described, all will depend on the management for their future prosperity.

The cross to be used is the next consideration, and I do not think a better one will be found than the pure Shropshire ram of good quality, not standing too high on his legs.

The Hampshire Down and the Dorset Horn would also make a desirable cross for this class of ewe. Two rams should be put to every hundred ewes. It must be borne in mind that these breeds will not flourish in large flocks—not more than two hundred should be in a flock at any time.

The life of a sheep is set down at an average of ten years, but I consider that the class of ewe described is good for twelve. The right time to mate them is at the age of two years. It will be seen at a glance that it is most important that the small sheep man should start on the right lines, and with the right sort of ewe.

The next consideration is the management of the flock. Sheep require constant and careful supervision, so that their welfare may at all times be seen to. Having mated your ewes with approved rams, it is very important that the flock should be placed on pastures that will cause them to improve in condition, as this means improved lambs, and a higher percentage of twins. After the rams are taken from the flock, the ewes should be kept in good condition, not allowed to be confined in a paddock where they are compelled to drink stagnant or brackish water, which is most injurious to ewes during the period of gestation, and will result in 5 per cent. of dead lambs at lambing time.

A good plan is to reserve a stubble field that has been stripped to put the ewes in, and do not let other stock have the best off before the ewes go in. In any case, one good stubble field should be reserved entirely for the use of the ewes until the beginning of March, and this should carry them on until they begin to drop their lambs, say May 1st. By this time the early fallow should be up and green and with some natural grass making a nice picking for the ewes that lamb first.

Now, the man who wants to make the best of his chances with his flock will do well to give them some little attention. They should all be carefully mustered and yarded, and with a pair of shears carefully remove all wool from the crutch and well over the tip of the tail. This will reduce the fly trouble to a minimum. After this is done, the flock should be placed in a convenient paddock for lambing. The owner, or whoever is in charge will go quietly among them every morning and drive out any ewes that have got young lambs into another paddock, or on to the fallow crop, which should be strong enough to stand a few sheep on it. Under no circumstances should a dog be allowed to follow the attendant to the lambing paddock. No matter how well trained the dog may be he will be a source of worry to the young mothers.

Any man that is worth his salt among sheep can part out ewes with young lambs without any trouble, and will not disturb the rest of the flock. He will be able to render any assistance required to any ewe lambing, or that may get cast. Managed on lines as instructed, the result should be 125 per cent. of good lambs. About the middle of July, the first draft should be fit for market at an average of from 30 to 33 lbs., and the whole drop should be parted with by the middle of August, leaving the mothers to go on the field to clear up any weeds that may want eating in front of the plough. The ewes will have nice time to recover, and be ready for mating when the owner chooses. At shearing time, under this treatment, the ewes should return him not less than 10lb. each of good wool. All ewe lambs that are dropped as twins should not be sold, but earmarked and kept to fill up any vacancies in the flock through culling out, death, etc. If this is done the owner will, and can increase his percentage to 150. If sheep generally were to get the treatment advised I think we should hear less of the cry that they don't pay and are a nuisance.

In conclusion, I would once more like to bring to the notice of all those who are likely to be interested in the breeding of sheep the great opportunities we have in this glorious country with its even climate and high pasture lands free from disease, and what a splendid chance there is for the sheep man to improve and build up his flocks and keep the money from being sent to the Eastern States to supply our wants. I feel sure that with good management and close attention to the breeds and crosses, we can produce as good a sheep as can be grown in any part of the world.

PIGS ON THE GOLDFIELDS.

— — — — —
G. S. HARVEY, Boulder.
— — — — —

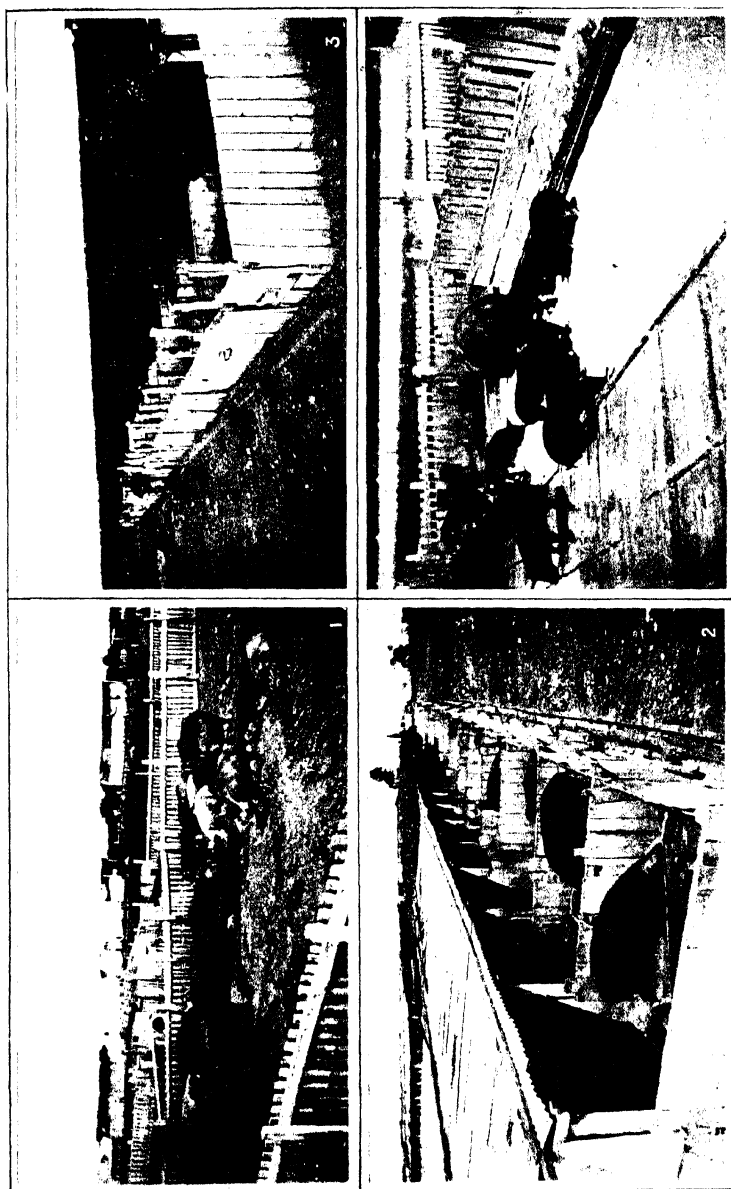
When honoured by the request to write a paper on this subject, I felt that I could say very little beyond what is probably well known to every farmer in the State. On further considering the matter, I think perhaps a few remarks concerning local requirements may not be out of place, as everyone present will not be acquainted with goldfields conditions. It has been stated by agricultural authorities that the pig is one of the most profitable animals to rear, but after about 15 years' experience on the Eastern Goldfields, I find that if the breeding of pigs alone is considered, the breeder may find his balance on the wrong side of the ledger.

This may be accounted for, in the first place, by our inability to grow the requisite amount of feed, necessitating buying on the market such foods as pollard, wheat, etc., and paying freight charges thereon, totalling in the aggregate a considerable price for feed, even if the market price on the coastal district is low, without considering a period such as this winter, when I have paid as much as 5s. 3d. per bushel for wheat at Kalgoorlie, especially for feeding pigs.

The next disadvantage under which we labour is the water supply. You are all aware of the supply to the fields from the Mundaring dam, but probably very few will think that we have to pay 5s. 3d. per 1,000 gallons of that water, which is no little consideration when the thirst of 1,000 pigs has to be quenched month in and month out during our hot, dry dusty summers. Fortunately there is a limited local supply of swill from breweries, hotels, restaurants, etc., which in a small degree relieves the stress and prevents the pig-breeder from becoming insolvent.

I have about 200 breeding sows but these cannot nearly supply my requirements, and I am frequently buying large quantities of slips wherever available to fatten for slaughter to supply the local demand for pork. My experience confirms the maxim that the better the breed the better the profit, and I have endeavoured to keep only pure-bred Berkshire, Yorkshire, and Large Black boars with as good a breed of sows as circumstances permit. I am inclined to think that the two best are the Berkshire and Large Blacks, and find that by judicious, though liberal feeding, I can place these on the market scaling about 60lbs. at the age of four months. The young pigs are kept in sties until weaned, after which they have large yards to run in, and I find them far superior to the sties for keeping clean and dry, permitting the young pigs to obtain sunshine or shade with sufficient room for exercise to properly develop and put on fat. Drafting is done weekly, so that the most forward are passed on to the next class and under no circumstances is anything permitted that will tend to interrupt their rapid progress toward maturity.

Good breeds, good feeding and attention, and good housing I find to amply repay for the outlay incurred. The Local Health Board has recently become infatuated with the idea that the whole of the yards and sties should be covered with a granolithic surface. This appears nice and clean, but any practical man knows that even if the cost was not prohibitive it is not feasible,



Pig-breeding on Eastern Goldfields.

1. Feeding and general view, Black Bros.' farm. 2. Sties. 3. Pens and housing. 4. Pigs feeding.

for, what would be the condition of the animals kept on this during blistering hot days or cold, frosty nights?

I am, however, hopeful that the board will be amenable to reason and avoid the necessity for fighting over the matter, as if the precedent be established every one raising pigs may be required to do the same.

I would now like to say a few words especially to those at this Conference who are raising pigs for the pork market, as the result of my experience when travelling the agricultural districts purchasing pigs.

Farmers, as a rule, do not give sufficient attention to this branch which should prove a profitable part of their business. I find that many simply let their pigs run about and breed as they like, with the result that the class of pigs they have to offer are lean, long snouted, inbred, and unthrifty animals. That class I refuse every time, as they eat their value before arriving at a fit condition to kill. Others have good stock, but either do not know how to look after them or they are neglected and often kept in filthy quarters, and under such conditions that it is not surprising to find them diseased.

The pig required for the pork market should be well shaped, that is a fair length with a good breadth, well matured, and scale 60 to 70 lbs. at about four months. This pig will also well suit for bacon at a few months later on if the market for porkers is unfavourable. The general idea is that a pig will do on anything, but this is a fallacy which can easily be proved, as also can the fact that good feeding and topping up with peas or wheat will, with suitable breeds, well reimburse the man who has faith to demonstrate for himself. Personally, I use large quantities of wheat which I find in every way satisfactory.

Finally, I desire to call attention to an aspect of the pig trade which is of considerable importance to all those engaged in breeding pigs, that is the disease called tuberculosis. As you are well aware this disease has been causing a considerable controversy in the papers with regard to dairy cattle, but so far as I know nothing has been said about pigs. Of late years this disease has been noticed in a considerable number of pigs when slaughtered, especially in the glands of the head. This, I am informed, is probably contracted in feeding either on contaminated offal and milk or by feeding them directly with portions of diseased animals that have become so emaciated that the owners have killed them for the pigs to eat at their leisure. In the early stages it is impossible to detect this when the pig is alive, consequently the buyer is not aware to what extent, if any, the disease has spread. Until recently the Government Meat Inspectors when they found the head glands only infected had the head alone destroyed. Now the order is that all pigs however slightly affected shall be destroyed.

Within the last two months I have been subjected to a very heavy loss through this order, and as business men you know that this cannot be continued; therefore I am compelled to go to districts which I know to be free from the possibility of infection. You who are living in the districts which are infected will see the necessity of taking some action in the matter. The order to my mind is arbitrary and inconsistent; arbitrary because the treatment meted out is much more severe than in the case of cattle affected, and I am informed by several medical gentlemen that the destruction of pigs under such circumstances is an economic loss and an absolute waste; inconsistent because if the condition of a pig only affected in the head renders it so dangerous, why are pigs outside the Metropolitan area and Kalgoorlie dis-

trict not inspected, and why are pigs allowed to come into this State from the Eastern States with the head removed, which may have been infected with tuberculousis, but passed as good and bearing the official stamp of inspection?

It has been proved over and over again that nothing is so costly in all ways as disease. It is therefore to the benefit of the breeder to minimise the risk by assuring to his stock all the advantages accruing from cleanly surroundings, pure air and water, good housing, and food suited to the animals' requirements. I trust that in discussing this paper, which is necessarily brief and imperfect, suggestions may be made that will be of mutual benefit to the farmer and the dealer.

THE SILO ON THE DAIRY FARM.

By J. A. KINSELLA, Dairy Expert.

Silos and dairying form such important branches of agriculture in other countries at the present time that to deal exhaustively with the questions would encroach too much upon the time of this Conference. Moreover, it is with considerable diffidence that I attempt to read a brief paper on these subjects. This may be explained by reason of the fact that my efforts in the direction of organising dairying amongst the farmers of the State during the last twelve months have not been attended with that amount of encouragement and success which I had hoped for.

About a year ago I had the pleasure of meeting in conference here representatives of the farming communities of various parts of the State. Since, I have had an opportunity of visiting some of the best agricultural and dairying districts with the result that I have been able to investigate and study the possibilities of growing fodder crops, and of carrying on dairying on practical lines at a profit.

From my observations, I have no hesitation in offering the candid opinion that there are great possibilities for a dairy industry in Western Australia. One of the difficulties met with, however, at the present moment in proffering advice on new methods to our old settlers is that of being able to convince them without practical demonstration or object lesson.

Without wishing to touch on matters of policy, I am convinced that without liberal State aid it will be a most difficult problem to establish the dairy industry in this State on anything like a firm and permanent basis within a reasonable number of years.

Admitting these remarks to be true, it may then be asked, how are we going to bring about this change of convincing our old established farmers as to the profitableness of dairying, and of inducing new settlers to take up this branch of agriculture?

It appears to me that the first and most important thing to be done is to bring into the State a class of settler who will adapt himself to mixed farming and who is not afraid to milk a cow. Following this is, perhaps, the most essential factor of all, viz., inducing our farmers to grow and preserve larger quantities of suitable fodder crops for the dairy cows. The latter can best be done by practical object lesson. If, say, four to eight reasonably cheap silos were constructed at some of our most important agri-



Pig-breeding on Eastern Goldfields.

1. View of yards, Harvey's farm.

2. Feeding and sheds, Harvey's farm.

3. House accommodation, Black Bros.

4. Shelter house and yards, Black Bros.

cultural centres, and arrangements made with a few enterprising farmers to grow suitable fodder crops, *i.e.*, crops most suitable to each particular district, for the making of ensilage, to be stored and cured in the silos under the direction of an experienced officer of the Department of Agriculture, the experiment would, in my opinion, work wonders in proving to the farmers the value of ensilage, as a cheap fodder, for producing milk. In support of this argument, I would refer to the good results brought about in the Transvaal, South Africa, where, four years ago, similar recommendations of mine were put into practice.

In many of our districts, during the past year, I have been frequently met with the following remarks as being the most serious drawbacks in the way of our being able to dairy successfully in this State :—

1. That all cows imported into the State required a few years to become acclimatised, and that they will give little or no milk the first year.
2. That if cows are not changed from one pasture and district to another, or sent down from the higher lands to the coast, they will go dry, in fact die.
3. That owing to the conditions existing in Western Australia, ensilage cannot be successfully made from mixed crops grown in the districts best suited for dairying.

The latter statement has come from men of experience and who are looked upon as authorities on the cultivation and the growing of grasses. I mention these facts for the purpose of showing the great necessity for experiment and practical object lessons being carried out in a small way at different centres of the State. Now, again referring to the much talked of drawbacks to dairying, I submit that these arguments have, in a very large measure, fallen flat through the practical object lesson carried out at the Brunswick State Farm during the past twelve months.

Through the wise and practical policy of the Hon. Mr. James Mitchell in starting this dairy farm, a number of valuable object lessons may be learned by those farmers inexperienced in dairy matters under the conditions prevailing in this State. The farm has only recently been organised, that is to say, it is less than a year ago since the initiation of this State herd was instituted on practical lines. Notwithstanding this fact, the Hon. the Minister for Agriculture has done, in that brief space of time, what it has taken the Department of Agriculture in New Zealand eight years to accomplish at the Weraroa State Farm.

I can go further and say that more has been accomplished at Brunswick by the installation of an irrigation plant and the construction of two silos.

Regarding drawback No. 1. Fifty imported pure-bred cows were placed on the Brunswick farm about twelve months ago, and experience has taught that they require no acclimatizing other than proper feed, water, care and attention. This is borne out by the fact that some of the cows have been milking over 11 months and are now in first rate condition.

With reference to drawback No. 2. I think we can safely say that these cows will not require to be sent down to the coast for a change, so long as they are properly fed, and that can now be done entirely with fodder grown on the farm.

Re drawback No. 3. It has been proved beyond question at the Brunswick State Farm that it is no more difficult to make first-class ensilage from

various kinds of fodder crops in Western Australia than it is in other countries.

Although, as already stated, this farm has only been in active operation for a short period, about 130 tons of good ensilage were made last season from mixed crops composed of green barley, oats, peas, etc. The cost of making the ensilage and housing it in the silos, *i.e.*, after the land was cleared, amounted to about 5s. per ton. In other sub-tropical countries experiments have demonstrated the feeding, or milk producing, value of ensilage made from such mixed crops as I have mentioned to be about 8d. to 10d. per 100lbs.

With ensilage made from mixed crops, a good ration for a cow of, say, nine to ten hundred pounds weight would be 30 to 35lbs. If we add to this 4 to 6lbs. of bran and one pound of oil cake meal, the yield of milk will be considerably increased and the animals kept in a much healthier and more robust condition.

I have already drawn attention to the importance of our farmers making ensilage. The silo is the only method—up to the present time—by which fodder crops are preserved in a succulent condition, thus enabling the farmer to utilise hay and straw to the best advantage. It will carry his cows through a time when he is not able to grow green stuff, and it will also be a great acquisition when the grass is poor.

The cow, unlike the horse, will not do well if fed entirely on dry food. The cow must chew the cud, therefore it thrives much better on succulent, and we may say, bulky food.

To my personal knowledge, the cause of failures in making ensilage in many parts of Australia was owing to the fact that many farmers jumped to the conclusion that almost any kind of rough stack, or heap, if sufficiently weighted, would answer the purpose. A good many have gone in for the stack and the pit, but the uncertainty of the quality of the ensilage, the unsatisfactory feeding results, and the comparatively large waste—particularly with stack ensilage—have caused many to discontinue making silage.

If green fodder is thrown roughly into a badly constructed pit silo, or heaped into a badly built stack, the temperature usually rises, which is a sufficient indication of the presence of combustion of some sort. Combustion takes away from the fodder one of its most valuable constituents, *viz.*, sugar.

The conditions necessary to ensure first-class ensilage may be set down briefly as follows:—

1. Cut the crop at the proper stage of maturity, *i.e.*, before it gets too ripe, and yet not while the crop is too soft and watery.
2. Chaff or cut the fodder small so as to permit of it more readily pressing into a solid mass.
3. Have the silo constructed so as to be absolutely air-tight.
4. Have the silo straight and smooth on the inside so as to offer no resistance to the uniform settling of the ensilage.

The absolute exclusion of air, and the advantage of first chaffing the greenstuff cannot be too strongly recommended.

The time to cut maize for ensilage is when the leaves lowest down begin to discolour, and when the kernels are full grown, just before they begin to harden or get ripe. At this stage the maize is at its greatest feeding value. It is always better to cut the maize a little on the early side than to risk injury by frost, which destroys the feeding value to a great extent. When cut, the

stalks should be allowed to wilt a little before being housed, but not long enough to allow it to lose too much moisture. When the maize is allowed to wilt for, say, a day the resulting ensilage will have a much nicer odour. If the crop is not very tender and sappy it is advisable to house it as it is cut.

Many machines have been devised for cutting maize in the field, but where labour is fairly cheap probably the most economical way is to cut by hand.

Storing the Fodder.

When carted in, the maize or fodder should be passed through an ensilage cutter and cut into lengths of $\frac{3}{4}$ in. It should be elevated by means of an elevator driven from the cutter or by a blower attachment. Care should be exercised to have the cut maize spread evenly as it is being put into the silo. Neglect of this will result in the hard pieces of the stalks and ears rolling down to the sides or corners and the consequence is less uniform maturing. The maize should be well tramped when going in, particularly round the sides. If the whole mass is not made compact so as to exclude the air it is sure to become mouldy and spoilt. It is also best not to expose too great a surface when feeding ensilage. To avoid this a small portion may be cut square down with a hayknife, and afterwards covered over with 1 ft. of straw, which will minimise the loss.

Where, again, a large herd is fed from the silo each day only uncover a portion and then replace the straw covering. When ensilage is made from such fodder crops as green lucerne, clover hay, rye, barley, tares, kale, etc., these crops should, as in the case of maize, be cut with a cutter and put in the bottom of the silo, the maize crop being then placed on top. If this is not done, it is important to weight the finer fodders very heavily by artificial pressure to prevent the entrance of air, which will cause mould to set in and so destroy the ensilage. All the crops named above should be cut a little on the green side to ensure good results. When completed the top should be levelled off and tramped evenly, after which two feet of long dry straw should be put on top to prevent the air getting in. With heavy maize no weighting is necessary, but in the case of fine vines having hollow stems, pressure then ensures better results. The deeper the silo the less pressure required.

Stack Ensilage.

I would not condemn the stack system of making ensilage, for I have seen and made first-class ensilage in stacks. While this is true, judging from personal observations in this State, it cannot be regarded as financially profitable to the farmer, owing to the enormous loss which takes place from the normal contact with the air and through improper building of the stack, insufficient weighting, etc.

It is pretty safe to say that with the average stack the loss caused by exposure to the weather during the winter would, in two seasons, equal the cost of building a small silo.

Those who do undertake to make stack ensilage will do well to observe the following points:—(1.) Select a site on an elevated spot with, if possible, natural drainage. (2.) It is of importance to build each layer of fodder evenly and upwards, maintaining a regular and unbroken contour, this will ensure an equal distribution of weight, and the whole stack will shrink more evenly and maintain its original shape. (3.) The whole secret in making stack

ensilage is to keep out the air, and to obstruct its ingress during the curing process, together with the proper weighting of the stack.

Construction of Silos.

There are so many types of silos now used in various parts of the world that I could not attempt to describe them all. There is the concrete, the brick, the square wood silo, the round wood silo, the stave, and the pit silo. Perhaps the best and certainly the most durable of all silos is the round concrete. The objection to that type for this country is the cost. Any farmer, however, who can afford to build a concrete silo has a structure which lasts a lifetime. Round concrete silos are usually built on either brick, stone, or concrete foundations. The first 6 or 7 feet of the wall above the ground are made 8 inches thick, and the rest of the wall 6 inches thick up to the desired height. In order to bind and strengthen the structure, quarter inch round iron is laid in the concrete every 12 to 15 inches. Strands of barb-wire will also answer the purpose. Door holes should be left in the concrete in a row up and down, about 36 inches apart. The doors should be 18 x 24 inches. A sheet of 16 gauge iron makes a good door. By hanging the iron at the top edge with two or three strong nails, the ensilage pressure on the inside will make it fit perfectly.

The Stave Silo.

If suitable timber can be procured, that is timber that will not warp or shrink, the stave silo may then be strongly recommended. Where the farmer can secure some standing or fallen logs and have them sawn to the length and size required, if he is handy with tools he can, with the assistance of the hired man, complete the erection of the silo, including the building of the foundation.

A stave silo to hold 100 tons of maize ensilage would require to be about 18ft. in diameter and 26ft. high. The first operation is to build a circular base or wall. This can be made of stone or mortar, and should be carried to at least two feet above the ground level to secure the timber from moisture, which latter means early decay. It is necessary that the top part of the wall should be of cement, with a groove of at least 4in. in depth on top to stand the staves in. This groove is made by placing a circular boxing of wood in the wall when building, and removing same when the cement is nearly set. It is best to have the timber cut all to one size—6in. wide and from 2 to 2½in. thick. The staves are the same width top and bottom and are bevelled a little on the inside like the staves of a barrel. A better method is to have the staves tongued and grooved and put together with white lead. The staves can also be spliced by having a separate tongued joint. In erecting the silo the staves are stood upright in the groove in the base and a few slats tacked on the inside until the hoops are put on. The hoops should be of from 5/8in. to ¾in. round bar iron, and can be either passed through an upright joist on the outside or through special iron clamps. By means of heavy double nuts on the hoops or rods the whole structure can be drawn together almost as tight as a barrel.

A silo 25ft. high should have at least six strong iron hoops, as the pressure is enormous. The inside of the stone or brick work at the bottom of the staves should be finished smoothly with cement. A stave silo need not be a very expensive structure. All that is required is to have it strong enough to

withstand the outward pressure, and fairly close so as to exclude the air from the silage. A ground or earth floor is just as good as any that could be put in and the most economical.

An important point is to use well-seasoned timber. Unless this is done trouble will arise from heavy shrinkage of the staves in dry seasons. This, in fact, is the chief drawback of the stave silo.

In New Zealand stave silos have been built of well-seasoned kauri timber, exactly on the lines which I have described, for about £25. When all the labour was employed the cost was £40 to £45.

Square Wooden Silos.

I have had experience with many types of square silos. Usually square silos are constructed in the bays of large barns, the girths running horizontally form the starting point for nailing the boards and the inside lining vertically to. Silos of this description, if built to hold a large tonnage, usually destroy the frame of the barn by the great pressure bulging out the walls. I have seen large sums of money spent in bracing and bolting square structures together, and, in the end, good results were not obtained. In building a square silo, first construct a stone or brick foundation. The foundation is best built 18in. to 2ft. above ground, this will prevent early decay of the sills and woodwork. The sills and framework generally must be made of fairly heavy square timber, and the corners of the frame should be bolted together. The whole structure requires to be rigid and strong to resist the great internal pressure. The inside may be first boarded up horizontally with rough boards, then two plies of P. and B. paper, closely tacked at all joints, and lastly a course of dressed tongued and grooved timber is put on vertically. The timber should be well seasoned and of some material which will not shrink or warp. If the inside is given a coat of ruberoid or Bon Accord paint it will be practically impervious to air and moisture. The outside may be covered with iron or weatherboards. A cheap roof can also be constructed of wood covered with iron.

My experience has been that it is practically impossible to build a square wooden frame silo of a fairly large capacity sufficiently strong to resist the pressure without bulging at some part, and very often square silos crack at the corners.

Round Wood Silo.

In describing briefly the foregoing styles of silos I have attempted to convey to those farmers who may have a sufficiently long purse a good practical idea as to the construction of a permanent and first-class silo. The most important question with us to-day, however, is that of being able to construct a reasonably cheap silo which will be within reach of the small farmer and new settler. The type which can be built cheaply and will meet our present requirements is the round wooden silo. A wooden silo must be made on the same principle as a cask, the great strength being secured by what corresponds to the hoops.

The advantages of a round silo are:—The largest cubic capacity for a given amount of building material, no springing or bulging of walls through internal pressure, no corners for waste and poor silage, and finally great strength for a minimum amount of building material.

Location.

The silo should be erected convenient to the milking shed and other buildings, and also to the oil-engine or horse-gear, so that the ensilage cutter may be easily driven. An elevator is usually used for filling in the chaffed stuff.

Where the stables and silo are on the side of a hill the earth may be cut out and used to form a platform for the cutter, this will considerably reduce the length of the elevator.

The small doors should be arranged one above the other in such manner as will permit of the ensilage being emptied down a canvas or galvanised iron shoot into a truck running into the milking shed. Failing this, large strong switch baskets are often used for conveying the ensilage from the silo to the feed troughs; the latter answers well for a small herd.

Building a Round Silo.

A suitable silo for a medium size dairy herd, with a capacity of about 60 tons, requires to be 13ft. in diameter and 25ft. high, and is constructed as follows:—

When a suitable place has been located and levelled, if required, a circle 13ft. in diameter should be described, which may be done with a piece of stick or twine, marked off to a radius of 6ft. 6in. The circle will represent the outside line of posts, which must be placed at a distance of 2ft. 5in. from the centre of each post, and should not project more than 6in. out of the ground. The earth and material around each post will need to be well rammed in order to make the foundation of the silo as strong as possible. Now, on the top of the posts mark a radius of 6ft. 4in. and fix the 9 x 3 sills in position; then the outside of each sill at the middle of its length will come flush with this circle and the ends projecting past it. The measurement of the outside edge of the sills will be found to be 4ft. 11 $\frac{3}{4}$ in. which should be securely spiked or bolted to the posts.

The plates should now be marked with two circles of a radius of 6ft. 4in. and 6ft. 2in. respectively; the latter will represent the inside line of the silo. Now halve for 4in. at one end the 4 x 2 studs, the positions for which will be marked on the outer circle at distances 16 inches apart. One space will be a few inches wider and may be used for port holes. When required the plates are carried out to the 6ft. 4in. circle so as to take the end of the studs, thus allowing the inside of the studs to stand true all round the silo at the 6ft. 2in. mark. Every care must be taken to see that the studs are kept plumb, and alternately place the 12 and 15 ft. lengths. When a number of them have been placed into position, say eight or more, temporarily place a couple of lining boards on the inside, and then the battens may be nailed to form the first hoop 18in. from the plate. It will take three battens to go round the structure, therefore the ends should not be butt-jointed to the same stud but allowed to overlap at least one. When the hoops to the height of 12ft. have been complete the top 4 x 1 $\frac{1}{2}$ studs are nailed to the sides of the 4 x 2 studs, thus allowing a lap of about 2ft. To add to the strength of the silo, the outside hoops are, as much as possible, made to break joints. This will also apply to the $\frac{3}{8}$ inside lining, with the exception that in order to make the inside as smooth as possible each stud will require to be butt-jointed. The paper may be tacked on in horizontal strips when filling.

The holes for doors should be made at intervals of 4ft. vertically, and about 18in. square. The doors to be made of double thickness 6 x 1 T. and G. Place, side by side, three 18in. lengths, and acrosswise three more lengths and nail together with a sheet of P. and B. paper in between. To receive the doors the stops are made of 3 x 1 which are nailed to the studs that form the jambs. This will make the door flush with the inside of the structure. To complete the door hole the sill and lintel may be made of 3 x 2 hard wood. The doors are fixed when the silo is filled. The weight of the ensilage keeps them secure, and are knocked back as they become exposed by the fodder being taken out from the top. A sheet of P. and B. paper ought to be used to cover the doors on the inside, leaving a good lap, and the outside joints may be filled with clay.

A thatch of straw, in dry districts, would be a sufficient roof for the silo, although the circular conical method is preferable. A light frame, made from the tops of the studs to a centre post and covered with iron or some patent covering should suffice. A plate marked and cut on the same lines as the bed plate—of lighter material—would assist in keeping the studs upright when making the frame. The roof, however, may be left until the silo is filled.

The following are the detailed particulars for the construction of such a silo:—

- 16 pieces 4ft. 6 x 6 underground hardwood posts.
- 15 pieces 15ft. 4 x 2 hardwood studs.
- 15 pieces 12ft. 4 x 2 hardwood studs.
- 15 pieces 15ft. 4 x 1½ hardwood studs.
- 15 pieces 12ft. 4 x 1½ hardwood studs.
- 48 pieces 15ft. 4 x 0½ hardwood battens.
- 8 pieces 5ft. 9 x 3 hardwood plates.
- 1300 feet run. 9 x 6 out spruce lining.
- 50 feet 6 x 7/8 T. and G. Baltic.
- 1 roll P. and B. paper or 56 sheets 6 x 3 x 26 gauge plain iron.

The cost of erecting a silo in this State on the above plan is estimated at about £40.

[The other papers read at the Conference will be published in *October Journal*.]

COLD STORAGE FRUIT.

A. D. CAIRNS.

At the banquet to the delegates at the Agricultural Conference the menu embraced, among other distinctive Western Australian products, Cold Storage Fruit. On the tables the guests found:—"Yates' Improved," "Rome Beauty," "Jonathan," "Five Crowns," and "Dunn's Seedling" apples. In pears they had "Winter Nelis," "Josephine," "Demaline," "Seckles," "Forell," and "Broome Park." Grapes, which were more prominently a cold storage triumph, ranged through "Almeria," "Black St. Peter," "Dora Dilla,"

"Flame Tokay," "Lady's Finger," "Muscat of Alexandria," "Raison des Dames," "Red Malaga," "Red Prince," "Purple Corinthian." The caterer, Mr. Berry, stated that the fruit was fit for any table, and, judging by the way it disappeared, he was quite certain that the taste and skill of the average delegate found ample scope in seeing the products of his land in full flavour, after a period of five months cold storage.

This is the first instance in the history of this State, so far as we know, of cold storage fruit being named on a menu, and while it is bare justice to the cold storage man to have the wares put down as coming from his store, it is too often the case that mistaken pride on the part of caterers, for some reason best known to themselves, makes them prefer to keep this fact in the background.

Comments at the table were sometimes given with the remark "They are too green." Could a cold storage man, or a grower, hear a more flattering comment on their fruit, after leaving the tree for a period of months? All the grapes were on the unripe side, with the exception of the "Flame Tokay," and the cause for the partial success of this grape was clearly seen in its over-ripe condition on storing, also evidence of injured berries.

Grape-growers should note that for long storage plenty of cork dust is necessary; do not skimp it, and if possible hang the grapes on sticks before running the cork dust in, so that the weight is carried and the grapes are supported in *every* direction. The Italians use a lye made with charcoal for dipping the stems in; this astringent may have some hardening power, and certainly seems harmless enough to be worth a trial. I would like to hear some grape-growers' experience in this direction, and also promise them, if possible, a sample of the cold storage grape at the next Royal Show.

DINGO TRAPPING.

In reply to an inquiry from the Department, Messrs. Dalgety & Co. have furnished us with the following information regarding the "Dingo Trail," a proprietary preparation for entrapping dingoes, which will, no doubt, commend it to sheepowners who are troubled by wild dogs:—

"*Re Dingo Trail:* We supplied a quantity of this to Mr. Paterson some time ago, and he found it so successful that he has advised quite a number of his friends to use it. The preparation is put up in quart tins which cost 30s.

The method for use is to set a dog-trap in the usual way and pour some of the *Dingo Trail* on pieces of sheepskin, making trails in various directions, along sheep pads for preference, and sprinkle a little of the mixture round them. There is some peculiar scent which this *trail* possesses that attracts the dingo from considerable distances, and they are apparently trapped most easily.

For some time past our branches in the Eastern States have reported good sales."

A NEW TREE-PULLER: A BUSSELTON INVENTION.

Mr. Dan. O'Connor, a settler residing in the Busselton district, has invented an ingenious machine, for which he has taken out patent rights, which he claims to be far in advance of any other device for pulling down trees in land clearing. The machine is dissimilar from other tree-pullers in that it is an elaboration of the capstan principle, with this advantage, that it may be moved about with perfect ease. In appearance it resembles a pair of strong dray wheels with an extra stout axle, standing on end, so that the wheels are kept in a horizontal position. Fixed to the centre of the axle are two heavy poles, to which is applied the propelling power, and above these is the main winding drum, with a false drum to carry back the slack wire or rope. Immediately beneath the poles is another winding drum to be utilised for hauling and stacking timber, with a second false drum to take up the slack. Below this again is a large grooved pulley, to carry an endless wire or belt for the working of chaffcutters and other implements previously mentioned. Two strong pawls are provided to prevent any reverse motion, and check recoil in case of breakage. To keep the machine in position, four heavy wire ropes are provided, which are made fast in opposite direction from the object to be pulled. These ropes are kept taut, and space allowed for a horse to pass under by a pair of tension poles. The guide wheels are provided to bring the haulage rope even on the winding drum, and are anchored to a stump or tree between the machine and object to be pulled.

In addition to its value as an effective tree-puller, the inventor declares that his machine will also drag and stack the trees together for burning. Gear is provided so that it may be adapted to work a chaffcutter, winnowing-machine, pump, or any other fixed machinery ordinarily found on a farm, with either hand or horse-power, according to the nature of the work, doing any class of work very smoothly.

With a rude model of his invention, Mr. O'Connor recently gave an exhibition of its power, in the presence of several witnesses. Taking the end of the hauling line, to which is fixed a stout hook, Mr. O'Connor passed it round a tree about eighteen inches in circumference, and hooking it to the line again, applied one hand to the poles, and in less than half a minute tore the jarrah out by the roots. Others rising in size up to a jarrah over a foot thick were pulled out all without any appreciable effort on the part of the inventor, and in no case taking more than a few seconds to bring down.

DEPOSITS OF PHOSPHATES IN THE MIDLAND DISTRICTS.

Mr. S. Goezel, Geologist, has been engaged for some months past, on behalf of the Department of Agriculture, in investigating the mineral resources of the extensive district lying between the Moore River and Dongarra, which is intersected by the Midland Railway, the object being to search for supplies of natural fertilisers. During June a discovery of phosphatic deposits was made at Cowala, Mr. De Burgh's station on the Moore River, extending in a northerly direction. On this Mr. Goezel submitted the following interesting *interim* report:—

"In cretaceous time the coast line extended from the vicinity of Gingin to Yatheroo and northwards, with a chain of long-stretched islands to the west. Those one-time islands are now joined to the mainland and enclosed within the coastal area.

The then newly-risen islands soon became the roaming ground of a large amphibian fauna, the parent stock of which fauna was, in all probability, already well established on the mainland.

The bone remains and excreta of this animal world, in conjunction with a prolific forest vegetation, have contributed materially towards the formation of a geological land facies, to which the name of "dirt bed formation" can appropriately be applied.

Dirt beds were formed on the ancient coast and on the then new islands, but whereas the latter became covered up and protected by a later-on-to-be-described rock formation, the dirt beds of the mainland were subjected to denudation, so that, at the present time their one-time existence can only be traced by a few small fragmentary remnants (such remnants occur near Gingin and Yatheroo). The bulk of the phosphoric acid, once stored within dirt beds along the old coast line, has long since re-entered the current through the vegetable, animal, and mineral kingdoms, whereas, a certain smaller proportion of that storage, after entering into not easily soluble chemical combination with iron, still lingers in the deposits of phosphoric iron at Dandarragan and other places along the extent of the cretaceous coast line.

The Rock Formation

which overlays and encloses the dirt beds or the insular facies demands special attention. It extends along the present coast, but at some distance inland it forms hill ranges and shows lateral extent from two to ten and more miles. Petrographically this formation varies from a calcareous sandstone to an impure limestone. The up-building of this formation commenced during the cretaceous times, and its steady progressing growth continued up to the present day. This growth was a sub-aerial one, and the bulk of the material of which this formation consists was at one time beach-sand.

Wind-blown sand has covered up the large accumulations of animal remains of cretaceous times, and often, also, forest vegetation rooting in such accumulations. Wind-blown sand has continued to cover up dirt beds and

specimens of fauna and flora of later times, the fauna in the meantime undergoing complete changes.

The flora of the oldest dirt-beds, judging from petrified tree specimens observed during my trip, bears already close relationship to the present day flora of those parts.

Near the Moore River bridge I unearthed a trunk of a eucalypt in which the inner texture is almost perfectly petrified. Near Minningarra Station a number of tree casts, resisting denudation better than their enclosure of sandstone, have been left standing like monuments, in an upright position, and in one of those tree casts the texture of the petrified bark can be seen clearly.

In a cave roof, four miles north of Nambough Creek, I found a beautifully-petrified specimen of a tree, showing the characteristic joints and striation of a calamite shining out in marble whiteness against an otherwise dark background. In some instances the hollow casts of tree trunks of huge dimensions reach from the surface down to the dirt beds into which the roots of those trees have originally spread. Near "Three Springs" such trunk casts appear like round shafts and give access to underground caves.

The calcareous limestone formation extends from the Moore River north and southward. Northward, I have found it to continue almost without interruption as far as the Arrowsmith River, and for some distance beyond that locality it appears in short hill ranges and isolated hills. The width occupied by this formation varies, as already stated, from two to about 10 miles, and I have found already, during my cursory observations, that a considerable proportion of its huge extent covers and encloses dirt beds, which latter are the depositing strata of phosphatic material. It appears to me doubtful whether the calcareous formation in its fragmentary extent beyond the Arrowsmith River encloses dirt beds of any size, inasmuch as the younger marine formations occupy the horizon above the sea level on which, so far, I have observed the development of dirt beds.

The petrified bone remains in the older dirt beds are those of amphibians, and excavations made by myself and Mr. De Burgh near the Moore River suggest that herds of animals have roamed on this one-time archipelago. Great differences in the size of corresponding bone-remains of animals, belonging to the same family, disclose great variety in the size of individual animals.

I have found layers of solidified phosphatic material of notable percentage (8.2 per cent.) of phosphoric acid, and consisting, as the magnifying lens discloses, largely of minute bone particles. From its constituency and occurrence, I take this material to be animal excreta, and larger bone particles, obtained by crumbling and sieving off, suggest that the excreta were those of piscivorous animals.

Caves.

The formation enclosing the dirt beds is in consequence of its afore-described origin, calcareous, porous, and easily permeable for atmospheric waters; it is therefore not surprising that caves abound in it.

Hill ranges, following more or less the present coast line, and consisting of this formation, form barriers between a large swampy tract of country from the east and the ocean from the west; huge water accumulations in the swampy country collecting during the winter rains find their way to the ocean in underground channels through those barriers.

The dirt beds have often been the initiatory cause for the formation of caves. During the decay of the organic matter contained in those beds the latter shrank, whereas in the meantime the covering sand became solidified into a roof rock. Dirt beds cropping out on the surface, or met with in underground caves, show usually open spaces between bed and roof from a few inches to several feet in width. In some instances I have also observed such contraction space between a dirt bed and its floor. In such cases the bed became attached to its roof by tree roots, which latter can be recognised in their now petrified state. Near Nambough Creek I entered a cave showing a dirt bed located alternately in roof and floor of the cave.

Most of the caves within this calcareous formation have commenced their growth in the contraction space of a dirt bed, and have gradually attained large proportions.

The breakdown of cave roofs discloses itself on the surface in funnel-shaped depressions. In some cases an entrance into a cave can be effected from such a breakdown.

Some of the caves are subterranean flood water channels, and become annually enlarged until they attain dimensions of great size. Finally a breakdown of the cave roof takes place. Nambough Creek and Stockyard Gully run their flood waters through such underground channels into the ocean.

The watercourse of Stockyard Gully is the outflow from a large tract of swamp country; it is alternately open and subterranean until it enters a large cave, from which the flood waters find their way into the ocean. This underground channel, in portions along which I followed its course, attains widths of over a chain and heights of roof of more than 40 feet.

The course of the Moore River through the hills of the calcareous sandstone formation was also at one time subterranean. A complete breakdown of the roofs of the caves through which this river wound its way gave it its present day surface course.

The same fate awaits the underground channels of Nambough Creek, Stockyard Gully, and other smaller ones. The annual floods widen these channels, and carry off the detrital matter accumulated during the dry season, so that it remains only a matter of time when the breakdown of the last roof portion will take place.

Dirt bed Formation.

A dirt bed when it appears in the wall or roof of a cave is easily recognisable by the porous honeycombed and cavernous texture of its exposed face. Closer inspection divulges not at all rarely some of the hollow spaces in the dirt bed rock to be casts of animal bones, from out of which the original bone substance has disappeared. Petrographically, the exposed rock face varies from calcareous sandstone to limestone. I have submitted several samples of such rock to qualitative test, and most of those samples gave a slight, but still decisive, reaction for the presence of phosphoric acid.

In some of the caves into which I have penetrated (Moore River, Minningarra, Nambough Creek) and adjacent to dirt bed faces I have found accumulations of material, samples of which material have been analysed by the Government Analyst and proved to have contained a notable percentage of phosphoric acid.

In digging into those accumulations I have found many bone fragments, and an inspection of the material through a lens discloses it to contain

largely, or in some cases to consist entirely, of minute bone particles, which are still recognisable as such.

After reviewing mentally my observations made during penetration into a number of caves situated in the same geological formations, but in far apart localities, I recognised the above-described accumulations of phosphatic material as residues from disintegrated portions of an adjacent dirt bed.

The skeleton part of an exposed dirt bed originated like the rest of the calcareous formation from wind-blown sand. The wind-blown sand during its deposition, besides enclosing and covering roots and stems of a prolific vegetation, enclosed and covered up also the dead bodies of a huge animal world and accumulations of animal excreta.

The original enclosure of large accumulations of organic remains constitutes, therefore, the difference between the dirt beds and the rest of the calcareous sandstone formation.

The process of disintegration, obtaining during the growth of a cave, if affecting a dirt bed, has the following effect on that formation, viz.:—The dissolving action of percolating atmospheric waters attacks the calcareous portions, and thereby opens the numerous casts enclosing residuary material of one-time organic bodies; with a complete solution and abduction of the lime carbonates, this residuary material with the rest of the (under those conditions) insoluble mineral constituents of the formation crumble together, and if not removed along an underground flood channel settle finally on the floor of the disintegrated dirt bed. During that process, the original contraction space between the dirt bed and its roof gradually increases, and, as a final result, a cave chamber is formed in the floor, of which the bulk of the disintegrated dirt bed constituents, less the lime carbonates, are densely settled.

Phosphatic Deposits.

During the first phase of the rock alteration the casts formed around organic remains were opened, the contents of those casts liberated and mechanically abducted and most of the hollow spaces became connected with each other. A consequent effect was that air received access to waters percolating through the rock.

The deposition of carbonate of lime (stalactites, stalagmites) is due to evaporation. In the case under consideration, a point was reached within the dirt bed formation, when through the access of air and consequent evaporation, the activity of the percolating waters became changed from a dissolving one into one of deposition.

By such later deposition of carbonate of lime, sometimes negative casts of animal remains were replenished, and more or less true copies of the originally enclosed objects formed. I have found numbers of petrifacts of such origin near the Moore River, and similar specimens are likely to be found in many other places of the dirt bed formation.

Such finds when palæontologically examined will throw more light on an animal world which in a far-off age has inhabited what is now the coastal region of this State.

A closer knowledge of this ancient fauna will be all the more interesting, in so far as by the life activity of its individuals, and their dead bodies, it imparted a distinct character to a large geological formation, and, what in this case is more to the point, acted as collecting and depositing agency of a large amount of phosphoric acid with that formation.

Analyses of Samples.

I have forwarded to the Department a few samples of phosphatic material from the vicinity of the Moore River, and have delivered, personally, a number of samples of Nambough Creek. During my trip I have submitted to qualitative test every likely feature I came across. Nearly every tested sample, when derived from the dirt bed formation, gave more or less the reaction for phosphoric acid. The best promising results I obtained from the residuary cave deposits resulting from disintegration of dirt bed portions as explained.

Under quantitative analysis by the Government Analyst, the percentage of phosphoric acid of the best promising samples, although considerable, was found not to be high enough for commercial working.

The highest percentage was shown by a sample from the Moore River, and was 15.53 per cent. phosphoric acid, equal to 33.90 per cent. of phosphate of lime, and the best sample from Nambough Creek contained only 8.75 per cent. phosphoric acid, equal to 19.10 per cent. of phosphate of lime.

At first glance such percentage appears disappointingly low, but, with due consideration of my previously-described observations, I find in the above figures no reason for disappointment.

PRACTICAL RESULTS AND DEDUCTIONS.

A HOPEFUL REPORT.

1. I have found that a calcareous formation of huge extent and situated within the coastal area west of the Midland railway line covers and encloses phosphatic beds (dirt beds).

2. In following this calcareous formation for over a hundred miles north of the Moore River, I have assured myself of the presence of dirt beds in localities situated far apart from one another. I obtained underground access by penetrating into some of the numerous caves. My observation leads me to believe that a large proportion of the area covered by the calcareous formation contains dirt beds.

3. I have also ascertained that the calcareous formation covering and enclosing dirt beds continues south of the Moore River.

4. The dirt beds, when exposed on the surface or in caves, show a cavernous texture; they are seamlike, but irregular. When cave growth disintegrates portion of a dirt bed, the residuary accumulations contain usually a considerable percentage of phosphoric acid.

5. Such residuary accumulations I have found in caves near Moore River, Mininingarra, Nambough Creek, and Three Springs, and the samples which have shown the highest percentage came from such residuary accumulations.

6. Easily accessible caves contain flood channels usually, and are therefore not favourable, either for the retention of residuary accumulations or even, if the residuary material of a dirt bed is retained, for the retention of the phosphoric acid in such material.

7. Much better results than those obtained from the best of my samples can rightly be expected from accumulations in cave chambers out of reach

of flood channels, and into which chambers access will have to be gained by digging. My experience at Moore River proves this already to be the case.

8. The nature and texture of exposed dirt bed portions (not residuary accumulations) justify me to expect that prospecting work will disclose rock material within the beds, which, when broken and subjected to a mechanical concentration by simple sieving, will give satisfactory results.

9. My observation as described in this present report and the results obtained from the samples submitted to analysis are apt to show that a comparatively small amount of prospecting work is likely to disclose workable phosphatic deposits in several portions of the indicated area.

10. The Nambough Creek deposits are favourably situated for the first operations; not only give numerous caves access to dirt beds, but the phosphatic material when raised could be shipped to Fremantle from a place on the coast opposite Cervantes Island, which place is only four to five miles distant from some of the best promising phosphatic deposits in the locality.

Conclusion.

Considering the dirt bed formation as a probable producer of fertilising material, I can hardly repress an optimism which obtrudes itself on my mind every time I review my observations.

When some 15 years ago I was entrusted by the then colonial Government with the geological examination of that portion of the State which is now known as the Eastern and Murchison goldfields, I received an impression of the huge extent to which single geological formations have attained in Western Australia, and gave vent to that impression in one of my official reports.

Here, again, I am confronted with a formation which covers already within the sphere of my inspection the area of a fair-sized province, and which may possibly double or treble its extent outside that sphere. I find a large proportion of this formation to cover and enclose dirt beds, a geological feature which bears its own testimony that a large amphibian animal world had, during its life process, and with the dead bodies of its individuals, deposited phosphoric acid within these dirt beds.

The dirt bed formation, figuratively speaking, can show its certificate of storage; whether the stored phosphates have been retained in form and quantity which will make it worth while to divert them to the direct use of mankind is a question which can only be solved by further exploration work.

As far as indications are concerned, I have the greatest hope that phosphates in quality and quantity will be disclosed, which will cause not only an improvement in the conditions for wheat-growing and in the agronomic conditions of the State in general, but which will also create a new branch of the industry occupied in the raising and preparation of fertilising material within the State."

Mr. Goetzl is now engaged on further exploration of the country, and samples have been received by the Department of additional deposits discovered by him at Nambough Creek.

The results of analyses made by the Government Analyst, Mr. E. A. Mann, of the samples of phosphates prove very promising. One sample showed 21 per cent. of phosphoric acid, equal to 45.9 per cent. of phosphate

of lime, and the other 18.8 per cent. of phosphoric acid, equal to 41 per cent. of phosphate of lime.

Mr. Goetz has informed the Department of Agriculture that there are thousands of tons of phosphates in sight similar to one sample, and a large accumulation in a cave similar to the second sample. He is actively proceeding with exploration work.

The deposit now being opened up is situated $4\frac{1}{2}$ miles from the landing place opposite Cervantes Islands. These islands are a little over 100 miles north of Fremantle.

WORK OF THE PARASITE.

By JNO. ROBINSON, State Farm, Nangeenan.

I would like to place on record the good work that has been done at the Nangeenan State Farm by the parasites introduced by Mr. Compere for the cabbage aphid.

During the month of May last the young cabbage plants became badly infested with aphid, so much so that it was considered advisable to feed them to the pigs: in fact, some of the plants were already dug up for that purpose. I was really of the opinion that the plants were beyond all hope. However, acting on your advice, I obtained a colony of the parasites from the Assistant Entomologist on the 3rd June and liberated them among the cabbages. The colony did not quite establish itself, which was accounted for by the cold, severe weather prevailing at the time. The work of the small percentage of parasites which did establish themselves—though not sufficient to cope with the pest—was so marked that another colony was obtained on the 24th June. As in the first instance, the tubes containing the parasites were placed in the heart of a badly-infested plant, the cork removed, and a box placed over the cabbage so as to afford absolute protection for the parasites. The box was taken away three or four days later. With the addition of the second colony, the insects were firmly established and their work has been wonderful, for at the present time the parasites have the aphid completely under control, and the badly-affected cabbages broke out in growth with renewed vigour and developed splendid centres. The cabbages showed exactly over what portions the pests were operating and where they ceased, *i.e.*, the under, or first, leaves of the cabbage which were distorted in their growth by the action of the aphid, whilst the leaves round about and of the centre are smooth and of regular shape, showing that the action of the pest had been reduced to such an extent as not to affect the growth of the plant.

I am quite satisfied as to the efficacy of the parasite for this particular pest, and would recommend it to anyone faced with such a difficulty.

FURTHER CONFIRMATORY EVIDENCE.

In corroboration of Mr. Robinson's statement regarding the satisfactory results derived by the liberation of parasites in the destruction of garden and orchard pests, we give publicity to the following testimony which has been received by the Department from well-known settlers:—

Mr. W. Godena, of Bonnievale, writes, under date August 21:—"I beg to thank you for forwarding parasites for the purpose of exterminating the Goldfields Garden pest. I might state that our little plot is free from the vermin, and is teeming with parasites."

Mr. H. J. McDougall, writing from "Brook View," Narrogin, on 19th August, says: "I have much pleasure in informing you that the parasites for the cabbage aphid have made a splendid clearance; the half-acre of kale was nearer dead than alive when they came, and was covered with aphid. Now, not one in a thousand has any number of aphid and they are nearly all parasitised."

Writing from Kalgoorlie on August 18th, Mr. Thomas Lloyd states: "The parasites have been successful in destroying all the aphid in my vegetable garden, I cannot see a trace of it on anything at present. I am growing cauliflowers, cabbages, beetroots, carrots, radishes, peas, lettuce, etc., and all are free from blight, or aphid, which must be due to the presence of the parasites I received from the Agricultural Department."

From "Kyanabe," Roelands, 31st July, Mr. G. N. Lowe writes: "The parasites arrived in splendid order and are doing good work."

A SETTLER IN THE SOUTHERN DISTRICTS.

By J. E. ANGOVE, Inspector of Lands.

Seeing that there is a considerable amount of new settlement taking place in the Torbay and Denmark districts, it would not be amiss if it were shown what can be accomplished with a limited amount of capital, combined with energy and intelligence, in that class of country. For the information of the new settler, I wish to state that they can rely on the statement as being true.

I had an interview with one of the pioneers in the Torbay district, and inspected his holding, which has been worked up to its present condition with commendable intelligence. About 15 years ago he selected 100 acres of land, comprising jarrah and redgum, from the late West Australian Land Co., and at that time he had deposited in the National Bank at Albany £100. He proceeded to build a house, and had let a contract for clearing four acres of land. During the progress of the clearing he was confronted with the staggering news that the National Bank had gone "bung"; he was therefore compelled to cease operations on his block. After considerable trouble he managed to obtain £40. He thereupon started operations upon another block of land that had previously been partly cultivated. He possessed two cows, three horses, and a dray, and went steadily on, gradually increasing his herd until he had

six cows, which were returning him 4lbs. of butter per cow per week. His market was Denmark Sawmills, where he realised 1s. 9d. per lb. for the butter. After remaining on this block for four years, he resumed operations on the first 100 acres, with £7 in cash, six cows, three horses, and dray. The £7 in cash was a source of worry, as there were so many things to which it could be applied, but after due consideration, and seeing that he had no drinking water on the land, he wisely spent that money in the purchase of two galvanised iron tanks, which he has to this day.

During the first year he fenced the block in, and went on steadily increasing the clearing by two acres per year for a few years. He started in a small way with grasses, and very soon found out the benefits therefrom. At the present time there are 32 acres cleared, comprising 7 acres of orchard (5 profitable), 8 acres in grasses, the remainder being used for cultivation of hay, potatoes, turnips, mangolds, etc. He has now 50 head of cattle, including 10 milking cows, 7 horses, and 20 pigs. Since the introduction of grasses his butter yield has increased to 7lbs. per cow per week.

The estimated returns, putting them at a safe figure, are as follows:—

	Per annum.				
	£				
From butter	100
Potatoes, etc.	100
Fruit (increasing each year)	75
Sale of cattle	100
					<hr/>
Total	£375
					<hr/>

The average cost of clearing is £8 per acre. His method of cultivation is as follows:—The first crop is oaten hay, yielding 2 tons per acre; then potatoes, with a dressing of from 6wt. to 10wt. of super. per acre. Then the plot is sown with grasses, comprising the following:—Red and white clover, paspalum, lucerne, rye-grass, and cocksfoot, which do well. This is fed off the following year and will remain good for three years, when the rotation of crops begins again. Upon six acres of grasses he has been depasturing 10 milking cows. The holding now comprises 600 acres fenced.

To bring the holding up to date, I suggested he should clear an additional 20 acres, replace the 10 milking cows with a first-class milking strain, provide a good separator (he has none at present), and the returns would be enormously increased. The new settler has now the advantage of the Agricultural Bank (which he had not), and can probably do more in lesser time. Everything on this holding is done intelligently and thoroughly.

THE PIG ON THE WHEAT FARM.

By "BUCOLIC."

In considering the special advantages which the pig offers to wheat-growers as a means of increasing the returns from the grain and decreasing the rate of soil exhaustion, it would be impossible to do more than generalise regarding average conditions. Agriculture in all its branches takes on so many phases that a number of exceptional cases occur to any proposition, but these do not affect the general issue.

One great advantage the pig possesses for the purpose is its prolificacy. The amount of inert capital sunk in breeding stock is comparatively trifling. The usual calculation is that each sow will produce ten pigs a year for ten years, and on an average of years this will be found a safe working basis. 300lbs. of wheat should produce a porker, 500lbs. a baconer. From these figures any man can calculate how many sows he need keep to convert a given number of bags of wheat into pork.

After fecundity, the advantage of rapidity of turnover may be placed. Few farmers desire to have their money locked up for any length of time, and any proposition which required that farmers should be compelled to wait a few years for their returns, as in horse or cattle breeding, would be out of the question. By easy arrangement the feeding processes can begin as soon as the grain is harvested, and, if feeding be properly conducted, the pigs, as porkers, will be ready for trucking to market four months after they are born. Or, if held until the baconer stage is reached, a further period of two months will be necessary. In either case the farmer would get his returns within the year of seeding, which is about the ordinary working system. It is, of course, true that many pigs are over twelve months old before they are of a fit size to be acceptable to the butcher, if such pigs ever are. But if fed on the only lines which would commend themselves to the wheat-grower, making a business of converting his first product into pork, the times given will be found to be easily realisable.

Security of return is another advantage which may be claimed for pig products, which possess both a high local value and a definite world's value. Being converted into bacon and hams, which actually improve by keeping, temporary irregularities and fluctuations are avoided. A well-fed, well-shaped pig has always a standard market value which translated into terms of wheat works out at from 3s. 9d. to 5s. and over per bushel. It is said that carcass butchers are guaranteeing pig-breeders 7d. per lb. for porkers for the next two years. Six pounds of wheat is more than enough to allow as the cost of producing pork, and this means an equivalent to 5s. 10d. a bushel for wheat.

These three advantages belong more particularly to the pig than to any other farm animal, while it possesses others in common with farm stock generally. The wheat fed to stock, for instance, can be walked to market

or to the trucking yards at railway station, thereby saving the heavy drain on the farm time and resources involved in carting. Unfortunately, a large number of our farmers are occupied for one-third of the year in carting their produce over the roads, and the waste of team time this entails seriously retards the animal production of the State. It is often objected that the feeding of stock entails a very large amount of labour, and were there no satisfactory method of conducting the operations without such, this outlet could not be urged. Any rural industry in Australia requiring much labour of the ordinary agricultural order would stand in a disadvantageous position in the world's market. Fortunately, this objection is not nearly so important as might be supposed. The labour element can be reduced to a comparatively minor point without interfering with efficiency, and when the saving in time of carters and teams is set off against the labour in managing a reasonably appointed wheat-cum-pig farm, it will be found that the credit lies on the side of the pig system. Such a farm would not have its pig branch conducted on the lines of a suburban pig-keeper's establishment, where the animals are kept in small pens and yards, and have to be handled three times daily. Such a system with hundreds of pigs would be utterly unsuitable, if only because of the heavy cost of tending. The American pig-farmer, whose pig crop is maize, has solved the labour problem by turning his shotes into the ripening fields, and allowing them to break down the stalks, and chew up the grains, which they worry off the cobs for themselves. The wheat crop is not satisfactorily dealt with in the same way, but, as will be seen later, the labour required in getting it ready for feeding is trifling.

It is impossible to enforce too strongly the point that stock-keeping on farms has a marvellous effect upon their fertility, and that the benefits of an increased price for the soil products are only a part of the gain derived from the presence of stock. All the best agricultural writers lay it down as axiomatic that where stock are not kept in a certain proportion to the holding the farmer should be able to furnish good reasons for their absence. Stock are regarded as an essential part of a properly-constituted farm, and he who continues without them is deprived of one of the principal parts of his revenue-producing machinery. At present the pig when kept by farmers is kept mainly as a grazing animal, which it is not. The position which the pig should occupy in the category of farm animals is that of converting high-class foodstuffs into meat products in a short time, and with the minimum of waste. An outline of the readiest system of feeding wheat to pigs on a farm will follow in the next issue of the *Journal*.

PIG-KEEPING.

With regard to the pig-keeping business, Mr. Smith (Victorian Pig Expert), has a word to say about the housing accommodation. To him it has always seemed cruel to sty-up pigs in low-roofed pens. "Pure air," he says, "costs nothing. Every owner should have a barn-like structure, say, 32ft. long, 10ft. wide, and 14ft high. This should be divided into sleeping apartments, with outside feeding yards, the floors of the whole being bricked and sloped for drainage. Both in summer and winter stock need pure air and healthy surroundings, and you cannot expect them to be healthy or clean if confined in small stuffy sties, and filthy muddy yards. Bedding may consist of straw, ferns, or leaves, which will also prove invaluable as manure after it has served its purpose. Farmers will find that pigs amply repay for care and attention given, and the small expenditure incurred in providing proper accommodation is more than made up by the increased constitutional vigour and robust health of the occupants of the sty. Remember, too, that when progeny. Now a word as to feeding. The farmer can utilise almost everything grown on the farm, and afterwards top off his pigs with peas, skim-parents are sound and healthy they transmit soundness and health to their milk, corn, etc. Feed regularly twice a day, and always keep a supply of charcoal and rocksalt near the troughs. If farmers wish to secure quick returns they must keep their pigs in condition from the time they are weaned, for the young pigs convert a much greater proportion of their food into flesh than do those full-grown. Pigs fully fed from the time of weaning and kept in condition will, when five months old, realise top prices in the market, which is infinitely better than keeping them on as stores."

MAIZE FOR PIG-FEEDING.

No doubt owing in some degree to the fact that it is a home product, maize enters largely into the rations for fattening animals in the United States. Indeed, it may be regarded as the staple feeding-stuff on the farm. In the extended experimental work in stock-feeding conducted in America, maize has always been prominent, but no greater mistake could be made than in accepting the results of American feeding experiments, however true they may be in that country, as necessarily applicable to the conditions in our own. It is difficult to explain why they should not be so, but the result of experience is that they very often are not. Maize is a case in point, and its popularity and success in the States and other countries have led to a somewhat unjustified and indiscriminate use of it in this country. When used with judgment there is no more valuable feeding-stuff when the price is reasonable, but indiscriminate use is the harbinger of trouble. Recent experiments have shown that, even in America, it is not suitable for very young pigs, and experience has shown that here it is inadvisable to use it for pigs under three months old, and even at that age a very few pounds daily to the litter is as much as is safe. Indeed, for pigs of any age it must be used sparingly. For brood sows or any animal in milk it is altogether unsuited, and many experienced feeders never exceed a proportion of a fourth of the meal ration for pigs of any age, and this is probably as much as is good for the health

of the pig or the quality of the pork. It has been shown experimentally and confirmed by experience that any considerable proportion of maize in the ration, although the animals lay on flesh rapidly, is apt to give soft pork of second-rate quality. In the case of very young pigs, disorders in the digestive arrangements are apt to occur, so that in their case it is advisable to exclude it entirely from the ration.

POTATOES FOR PIGS.

Although the feeding value of potatoes is undoubted, they cannot be successfully fed to pigs unless they are first cooked, and roots are more palatable if cooked and meal added. A few foods appear to require the modifying influence of heat and moisture to render them palatable and digestible. The man who is willing to cook food for his stock usually gives his animals many attentions which others pass by as not being worthy of the time. It is this extra care and the larger variety of foods supplied, rather than the cooking, which make animals of superior quality. For the purpose of affording variety, the various grains, roots, tubers, together with clover and chaff, may be boiled or steamed and used as part of the ration.—*Irish Farming World*.

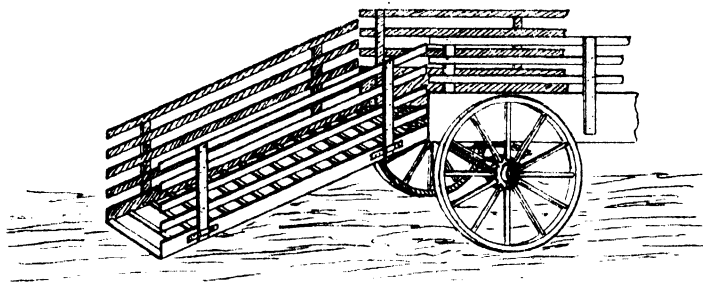
THE "LARGE BLACK."

In a critical report upon this breed an English authority says:—"A breed which has weathered the storm of agricultural distress, and is to-day found to be so largely in favour as a commercial adjunct to the tenant farmer's holding, must possess the all-important quality of utility in a great degree, and there can be no doubt but that it is this quality which has conduced to the survival of the Large Black pig, and to its present pre-eminence as the animal best suited to the needs of the modern breeder, feeder, bacon-curer, and consumer. Thirty years ago Large Black pigs were fed to enormous weights, but being in the hands of men who had to study the market and supply a carcass which would meet the requirements of the times, the great weight has given way to greater quality, and the Large Black now yields at a very early age the chief desideratum, viz., a long, deep-sided carcass, of 160lb. to 190lb. dead weight, light in shoulder, jowl, and offal, and showing a larger proportion of lean meat than any other breed. The pre-eminence of the breed in this respect was strikingly illustrated in the results of the carcass competition for pigs held in connection with the Christmas show of the Suffolk Fat Cattle Club. Large Blacks are exceedingly docile in disposition, and the natural carriage of the ears, well forward over the eyes, is said to contribute materially to a quietness of habit which renders them peculiarly adapted to field grazing. Their colour also is claimed to be an advantage, as it enables them to be pastured, or field-fed, during the summer months without suffering from sun-scald. The excellent character which the breed bears for fecundity is visibly supported by the capacity with which the sows are endowed in respect to length and depth of carcass."

PIG-LOADING RACK.

(The Farmer and Grazier.)

It is not the easiest thing in the world to get a pig into a waggon. A loading "rack" attached to the conveyance will save a lot of trouble. Such a "rack" can easily be made. Let the bed-piece consist of two pine boards 6in. wide by 9ft. long. These are fastened together by three cross-pieces of the same material of proper length, so that the "bed" will just fit in between the sides of the waggon-box. A floor is laid on these cross-pieces on which short strips of lath are nailed to prevent the pigs from slipping. At one



end the sides are notched to fit on the bottom of the waggon-box. There are two staples on each side, by which the sides are fastened on. The "rack" is made like an ordinary top-box, with the exception that each side is composed of three narrow boards about 4in. apart, and nailed to three cleats (the two end cleats to be on the inside and the middle one on the outside of the rack), and projecting down the side of the waggon-box. For unloading the pigs nothing but the bed-piece need be used, which, being light, may be easily thrown on and taken with the waggon.

DISTRIBUTION OF DAIRY COWS.

In pursuance of the Department's policy for stimulating the dairying industry in this State, the co-operation of societies in some of the agricultural districts has been requested to facilitate the distribution of dairy cows to farmers prepared to embark in the industry.

It is pointed out that the deferred payment system adopted by the Department provides for the supply of dairy cows to suitable applicants on two years' terms, repayable in eight quarterly instalments with five per cent. interest added, sufficient security being given, preferably first or second mortgage on land, freehold or C.P., or substantial guarantee.

When the applications nominated by societies number one hundred, an officer of the Department will be instructed to inspect and report on the securities before they are submitted for the approval of the Minister.

BUNBURY DAIRY FACTORY.

The successful inauguration of a dairy factory at Bunbury should act as a direct encouragement to farmers in other promising districts and give a hearty stimulus to the development of the butter industry in this State. In order to afford suggestive and useful information on the subject we subjoin details of the system upon which the company at Bunbury are conducting their establishment, from the time the cream is received at the factory to payment of the suppliers.

Receiving of the Cream.—The days fixed for receiving cream during the winter months (subject to alteration) are Mondays and Thursdays. A uniform system of delivering cream to the factory enables the factory manager to have proper control over the cream, and permits of it being properly and uniformly ripened by means of a fermentation starter, necessary in order to secure an exhaustive churning of the fat from the cream, and ensure a better keeping article of butter.

All cream and milk will be calculated and paid for on the butter-fat basis of the Babcock test, which has long been adopted in all up-to-date butter-making countries as the only true and accurate system of distributing on a commercial basis the proceeds from milk and cream amongst farmers. The advantages in supplying to a co-operative company are that the farmer has a voice in the conduct of the business, and has at all times access to the weighing, sampling, and testing of his cream. He is also privileged to take and have tested at the factory check samples of his cream, if properly taken at the farm.

Each supplier's cream will be carefully weighed, sampled, and tested with the most improved Babcock milk-tester now on the market. The samples taken for testing are also weighed with analytical scales, which ensures absolute accuracy, and is superior to the old method of measuring the samples with a pipette.

Rise and Fall in Prices.—Owing to the fact that such a small quantity of butter is manufactured in this State, the price must naturally be controlled by the prices obtaining in the Eastern States. Suppliers will therefore understand why it is necessary for the directorate to alter the price paid for butter-fat from time to time, and also the price for which the commercial butter is sold.

Care of the Cream.—Cream must be delivered to the factory in a sweet and untainted condition. The supplier who delivers sweet cream will in nine cases out of ten get a better test than if he allows the cream to become sour. The choicest article of butter will always ensure the highest current price, and very often a premium in addition.

Monthly Payments to Suppliers.—The directors make monthly payments for butter-fat to all suppliers on the tenth day of each month. A record of the weight of each supplier's cream and the amount of butter-fat contained are forwarded to him promptly.

TRADE OUTLET WITH CEYLON.

The "Times" of Ceylon, of August 5, publishes an interview with Mr. Duncan Paterson, of Fremantle, who is making a tour of the East and making inquiries relative to the opportunities that exist for developing trade in Australian products.

Mr. Paterson is reported to have said to the representative of the journal referred to:—

"We shall be able to send, before very long, from West Australia enormous quantities of flour to Ceylon. Australia will have to look to the East for a consuming market, but, as we are—I mean W.A.—geographically nearer Ceylon and the East than any other part of Australia, that branch of the trade ought to come to us. Also we can send you an unlimited quantity of oats, though, of course, your market here for this commodity is small. Tonnage is, however, a great difficulty, as outside the mail steamers there is no shipping trade between Fremantle and Colombo. I may also point out that there is little prospect of cheap freight between Fremantle and Colombo until there are large quantities of cargo offering, and large quantities are not in sight at present. New South Wales and Victoria each subsidise lines of steamers to the Far East, and West Australia may be forced to do the same before long. Presumably, an export and import trade being beneficial to Colombo, Ceylon might also take a part in a subsidy.

Fruit is the Article

which appeals to me most at the moment. It is over 20 years since I first lived in the East, and coming back again I find the same old want of satisfaction in the Eastern fruits you get to eat. What you want in the East is something with a flavour, such as a well-conditioned apple or pear or a really good peach. We can send you apples, pears, peaches, plums, grapes, melons, and indeed almost any kind of fruit for which one craves most after years in the tropics. This is again, however, a very serious difficulty, because, while the harder fruits such as apples can be carried in the ordinary way, yet refrigerating space is absolutely necessary for the soft fruits, particularly peaches, greengages, and plums. Mail steamers do not like opening their refrigerating chambers at Fremantle, and indeed will not do so, so that the small quantity of West Australian fruit coming here is really carried by courtesy in the purser's cold storage department. Representations might be made to the mail companies with a view to get them to carry fruit in the refrigerating chambers from Fremantle, and possibly your Chamber of Commerce might assist in this respect. The mail companies just now have to be careful, in any case, because tea takes the flavour of apples unless special care be used; but, surely, it should be within the ingenuity of shipping companies to overcome these difficulties where they exist. I have a good deal of correspondence with me from the president of the West Australian Fruit Growers' Association, and shall be most happy to place it, with any other information, at the disposal of anybody interested. I was especially asked to ascertain whether Colombo could not, in addition to consuming West Australian fruit herself, also be the disseminating station for the southern part

of India. One of the reasons why there are not more trade relations, at present, between Ceylon and Western Australia is that neither country knows sufficient of the products or the requirements of the other. Our fruitgrowers will be only too pleased to push the trade for all it is worth, and letters addressed to the president of the West Australian Fruit Growers' Association, Perth, will be welcomed."

West Australian Coal.

Asked as to the quality of West Australian coal, and if the State would welcome an invitation to tender for Ceylon contracts, Mr. Paterson said:—"At present our coal trade is practically only in its infancy, as we are producing something less than 200,000 tons annually, a large proportion of which is used by the West Australian Government railways. Within the last year or two, however, a very fair demand has set in for West Australian coal for bunkering purposes, and steamers can call at Bunbury and bunker at about 14s. a ton trimmed, while at Fremantle the present cost is about 17s. It will probably be a few years yet before Western Australia is actually in pressing need for foreign markets for her coal. Our coal is a quick-burning article, it leaves no ash; but its rapid combustion is not of course altogether in its favour. It has been freely used by the mail steamship companies passing through Fremantle. Probably if anything like a satisfactory price could be obtained we could ship 50,000 tons per annum just now. A little extra inducement in price would probably produce plenty of coal."

Australian Investments.

What do Australians think of Ceylon as a country to invest their money in?

"So far as West Australians investing money in Ceylon is concerned, that can hardly be looked for just now," was the reply. "You would understand this better if the millions of acres of land not yet taken up in Western Australia were unfolded before your eyes. Our land laws and conditional purchase terms for the acquirement of land are most liberal, and the Government Agricultural Bank will advance pound for pound sterling up to £300 expended in clearing and stocking land. With such a fertile soil as we have in Western Australia, farming and stock-raising are very profitable pursuits, and it is not to be wondered at that many business men are retiring from active commerce, and also quite a number of mining men have lately taken up large tracts of country and gone in for farming. I hardly think, therefore, that West Australian money can easily be attracted to Ceylon, although our business men are keenly on the look-out for attractive investments. Of course, your tea and rubber companies are bound to be sure investments, while our mining industry, for instance, is always speculative. Our big companies are very carefully handled, however, and are on a very sound basis. If you ask my friend Mr. J. W. Sutherland, general manager of the Golden Horseshoe Company, who is a homeward passenger by the "Moldavia," he will tell you, if he likes to be communicative, that the Horseshoe pays about 16 per cent. per annum and carries four months' ore reserve inside.

Ceylon Industries.

"Your tea and rubber companies are practically unknown in Western Australia, so far as their investment values are concerned, but it would do

no harm to have the returns of your leading companies published in Western Australia through the Ceylon Bureau. I do not know what the tea and rubber companies pay in the way of dividends, but last year Western Australia paid over £1,700,000 in dividends, and since mining was first started on a large scale in Western Australia about 16 years ago, the total output of minerals comes to about 84,000,000lb. Wider knowledge of the investment fields in each country can do nothing but good, as at present both countries seem very much in the dark as to the respective possibilities of the other."

POULTRY NOTES.

By FRANK H. ROBERTSON.

October is a good month for hatching, get out as many chickens as possible.

Watch sitting hens for lice; keep the nests clean, and use Insectibane.

Sitting hens are often egg-eaters; to break them of this habit, take an empty egg-shell, fill it with a paste made of mustard and kerosene, or mustard and phenyle, and leave close to the egg-eater.

Well-crushed oats is one of the safest and best chicken feeds; a small grain crusher is necessary for this; it costs from 15s. to 30s.

Give the sitting hen a good feed of grain just before the chickens hatch, whole maize is very suitable.

Do not be in a hurry to feed your chickens just hatched, wait until they are hungry.

Be sure that brooder chicks do not get a chill, this is one of the chief causes of diarrhoea; if so affected, give them warm milk and feed on boiled rice sprinkled with a little ground ginger.

Ducklings will not get the staggers if well sheltered from the sun. Always have drinking water, grit, plenty of green stuff, soft feed only, and feed and water as early in the morning as possible.

If ducks intended for the table will not fatten, look for worms, kill one of the ducks, and carefully examine the intestines.

Watch the perches for Red Mite (the common fowl-house lice); it starts in the underneath part of the perches. Take all perches out, and paint them with kerosene, or better still, with Avenarius, it keeps the lice away.

Hens which lay brown eggs can be relied on as sitters.

The patent egg-carrier is best for sending eggs to market, but the wires are generally too wide; pinch them in so that the size is reduced and the egg carries quite free of the woodwork.

Only send poultry to market when in good condition, thin old birds fetch low prices.

THIRD EGG-LAYING COMPETITION AT SUBIACO.

[Commenced July 1, 1908. To close March 31, 1909.]

Appended, herewith, are the results for the first two months laying at the new competition which commenced on the 1st July and is to run for nine months, terminating on the 31st March, 1909.

Eggs for sitting from any of the pens are obtainable on application to the Manager at Subiaco; prices range from 10s. 6d. to 21s. per dozen. A price list is forwarded on application, or see the *Journal* for July.

The following are the results up to August 31:—

The figures in black indicate the winner of the monthly prize.

The first column of figures indicates the present position of the pens in the competition.

Pens marked thus * remained in from last competition.

FOWLS.

Six pullets and one male bird in each pen.

Owner and Breed.	July.	Aug.	Total
1 Mrs. A. S. Craig, Black Orpington	131	145	276
2 J. W. Buttsworth, White Leghorn	113	133	246
3 Mrs. L. Mellen, White Leghorn	106	126	232
4 Mrs. Kynaston, White Leghorn	91	130	221
5 Mrs. C. F. Schmidt, White Leghorn	104	117	221
6 Lionhurst Poultry Farm, Buff Leghorn	104	116	220
7 Sunnyhurst (S.A.), White Leghorn	109	111	220
8 Gaffney & Bach, White Leghorn	102	117	219
9 C. B. Bertelsmier (S.A.), White Leghorn	94	125	219
10 C. Herbert, White Leghorn	86	129	215
11 Bon Accord Poultry Yard, White Leghorn	94	119	213
12 Greenville Poultry Farm, White Leghorn	97	114	211
13 A. M. Thomas, White Leghorn	77	133	210
14 Glendonald Poultry Yard, Silver Wyandotte	92	117	209
15 S. Craig, White Leghorn	81	126	207
16 Mrs. Hobley, White Leghorn	87	118	205
17 Greenville Poultry Farm, Silver Wyandotte	105	97	202
18 T. W. Martin, White Leghorn	76	126	202
19 E. Garbett, White Leghorn	71	129	200
20 Paddy King & Salter, White Leghorn	95	101	196
21 W. Elliot, White Leghorn	89	109	198
22 A. H. Padman (S.A.), White Leghorn	71	124	195
23 Mrs. A. E. Kinnear (S.A.), White Leghorn	82	110	192
24 J. Gaffney, White Leghorn	83	106	189
25 T. Ockerby, White Leghorn	62	126	188
26 Homebush Farm, White Leghorn	80	107	187
27 Shamrock Poultry Farm, White Leghorn	82	99	181
28 R. G. Flynn, White Leghorn	86	92	178
29 Mrs. Flynn, White Leghorn	78	94	172
30 *J. Stuart, Golden Wyandotte	69	101	170
31 Honner and Forbes, R.C. White Leghorn	69	99	168
32 Craig Bros., Black Orpington	70	97	167
33 *T. W. Martin (late O. James), White Leghorn	62	104	166
34 J. R. De Morrison, White Leghorn	61	104	165
35 G. Bolger, White Leghorn	49	115	164
36 *White Wings P.F. (No. 2), White Leghorn	71	93	164
37 Coolgardie Poultry Farm, White Leghorn	66	97	163
38 G. George, White Leghorn	66	96	162
39 *Adelaide Poultry Yard, R.C. Brown Leghorn	62	99	161
40 Mrs. McGree (No. 1), White Wyandotte	49	107	156

EGG-LAYING COMPETITION—*continued.*FOWLS—*continued.*

Owner and Breed.		July.	Aug.	Total.
41	Ontario (S.A.) White Leghorn	72	82	154
42	South Perth Poultry Farm, R.C. White Leghorn	61	91	152
43	Devine & Migro, White Leghorn	58	94	152
44	Mrs. Hughes, White Leghorn	57	92	149
45	A. E. Champness, White Leghorn	40	108	148
46	R. L. Martin, Black Orpington	95	84	143
47	Hillview Poultry Farm, White Leghorn	51	92	143
48	The Elms Poultry Yard, White Leghorn	51	92	143
49	O.K. Poultry Yards, White Leghorn	34	105	140
50	Mrs. Younger, White Leghorn	41	97	138
51	Craig Bros., White Orpington	57	73	130
52	Craig Bros. (S.A.) (No. 2), White Leghorn	49	81	130
53	*Mrs. McGree (No. 2), White Wyandotte	40	90	130
54	*J. Stuart, S.L. Wyandotte	57	72	129
55	F. Whitfield, Minorca	57	71	128
56	*J. D. Wilson, Brown Leghorn	42	84	126
57	*Craig Bros. (No. 1), White Leghorn	30	93	123
58	*Mrs. H. M. Kelley, Gold Wyandotte	33	85	118
59	White Wings Poultry Farm (No. 1), White Leghorn	52	65	117
60	Adelaide Poultry Farm, Buff Leghorn	33	82	115
61	*J. Stuart, Silver-pencilled Wyandotte	33	74	107
62	*J. Miller (late Dobson), Silver Wyandotte	34	59	93
63	*Mrs. H. M. Kelley, White Leghorn	23	68	91
64	T. Hickey, White Leghorn	0	84	84

Winner of first monthly prize, Mrs. A. S. Craig, Black Orpingtons, 131 eggs; second month, Mrs. A. S. Craig, 145 eggs.

DUCKS.

Six ducks and one drake in each pen.

Owner and breed.		July.	Aug.	Total.
1	White Wings Poultry Farm, Buff	114	177	291
2	H. Carr and Son, Indian Runner	142	137	279
3	*Mrs. L. Mellen, Indian Runner	131	141	272
4	*G. Thomson, Indian Runner	131	135	266
5	Mrs. R. B. Moyle, Indian Runner	132	127	259
6	F. Whitfield, Indian Runner	106	148	254
7	D. F. Vincent, Indian Runner	119	132	251
8	*Smith & Davenport, Indian Runner	116	128	244
9	J. Moyle, Indian Runner	114	115	229
10	C. Geddes, Indian Runner	89	134	223
11	C. Phillips, Indian Runner	101	117	218
12	Adelaide Poultry Yard, Indian Runner	49	105	154
13	Greenville Poultry Farm, Indian Runner	68	85	153
14	Bon Accord Poultry Yard, Buff	54	86	140
15	J. Robertson, Indian Runner	32	108	140
16	*South Perth Poultry Farm (No. 2), Pekin	7	116	123
17	*F. Whitfield (late Dusting), Indian Runner	72	48	120
18	A. W. Edgar, Indian Runner	12	96	108
19	C. W. Johnston, Indian Runner	24	26	50
20	South Perth Poultry Farm (No. 1), Pekin	0	50	50
21	Coolgardie Poultry Farm, Pekin	0	40	40
22	Simplex Incubator Factory, White Indian Runner	4	9	13
Total		1,617	2,260	3,877

Winner of first monthly prize, H. Carr and Son, Indian Runners, 142 eggs; second month, White Wings Poultry Farm Buff Orpingtons, 177 eggs.

EGG-LAYING COMPETITION—*continued.*

SECOND YEAR'S TEST—FOWLS.

Owner and Breed.					July.	Aug.	Total.
1	J. Stuart, Golden Wyandotte	...	...	...	69	101	1,570
2	Craig Bros. No. 1, White Leghorn	...	...	...	30	93	1,418
3	Mrs. McGree, No. 1, White Wyandotte	...	...	...	49	107	1,344
4	J. D. Wilson, Brown Leghorn	...	...	...	42	84	1,251
5	T. W. Martin (late James), White Leghorn	...	...	...	62	104	1,241
6	Mrs. Kelley, Golden Wyandotte	...	...	...	33	85	1,237
7	Adelaide Poultry Yard, R.C. Brown Leghorn	...	...	...	62	99	1,210
8	J. Miller (late Dobson), Silver Wyandotte	...	...	...	34	59	1,126
9	J. Stuart, Silver-pencilled Wyandotte	...	...	...	33	74	1,032
10	White Wings Poultry Yard No. 1, White Leghorn	...	...	...	52	65	1,012
11	Mrs. Kelley, White Leghorn...	...	...	...	23	68	901

SECOND YEAR'S TEST—DUCKS.

Owner and Breed.					First year.	July.	Aug.	Total.
1	G. Thomson, Indian Runner	...	...	...	1,571	131	135	1,837
2	F. Whitfield (late Dusting), Indian Runner...	...	...	...	1,493	72	48	1,613
3	Smith and Davenport, Indian Runner...	...	...	...	1,333	116	128	1,577
4	Mrs. L. Mellen, Indian Runner...	...	...	...	1,244	131	141	1,516
5	South Perth No. 2, Pekin	...	...	...	840	7	116	963

POTATO DISEASES.

By G. F. BERTHOUD, Hamel State Farm.

Of two of the varieties of potato disease, one which I take to be bacterial—perhaps *bacillus solanacearum*—is a very bad pest here. The sour, wet, and unsuitable soil may have something to do with its propagation. The object of my experiments is to find out if it may be possible to check or prevent it by dipping or soaking the cut sets in a solution which would kill the germs of the disease without also killing the tubers.

Usually when dug, all the tubers appear to be sound, except when cut a slight yellow spot or ring will be noticed at the stem or root stalk end of the tuber. Such tubers when stored in a cool place will keep apparently sound for a long time; but on the other hand, if they are put in a close warm place suitable for sprouting, etc., the disease develops rapidly and rots the whole potato, always starting from the stem end. In June I cut some sound and some diseased tubers, after cutting off the stem ends, and soaked them for two hours in a solution of 3lbs. of bluestone, 4lbs. washing-soda (quick-lime will do as well), 3lbs. treacle, and 30 gallons of water.

Tuber A is one of the sound tubers which remained so. Tubers B were affected and have partly rotted, from which it would appear that the treatment was of little value. Tuber C was not treated, and Tuber D, showing disease, was not treated.

In previous experiments, the tubers were soaked for two hours then at once planted out. I am doing this now with all the potatoes. The treatment appeared to check the disease, but what is wanted is something to kill the germs outright.

WESTERN AUSTRALIAN CROP AND LIVE STOCK RETURNS.

The following table summarises the area, production, and average yield per acre of grain, pulse, hay, and potatoes in this State for the season ended 29th February last; also showing totals for 1907:—

			Area: acres.	Production: bushels.	Average: bushels.
Wheat	..	..	280,549	2,933,350	10.5
1907	..	..	250,283	2,758,567	11
Maize	..	..	86¾	1,080	12.4
1907	..	..	101	919	9.1
Oats	..	..	46,546½	719,553	15.5
1907	..	..	28,363	457,155	16.1
Barley, malting	..	..	3,162½	40,494½	12.8
1907	..	..	1,138	14,014	12.3
Barley, other	..	..	2,844½	35,470½	12.5
1907	..	..	2,452	34,813	14.2
Rye	..	..	638	4,904	7.7
1907	..	..	643	4,893	7.6
Peas and Beans	..	..	903½	8,567	9.5
1907	..	..	937	9,402	10.0
			tons.	tons.	tons.
Hay, Lucerne	..	..	144¾	250	1.7
Hay, Oaten	..	..	33,732¼	32,414	1.0
1907	..	..	32,521	30,920	1.0
Hay, Wheaten	..	..	94,756¾	102,597¾	1.1
1907	..	..	116,164	126,079	1.1
Hay, all other kinds	..	..	1,874	1,363¾	0.7
1907	..	..	1,145	1,113	1.0
Potatoes	..	..	1,835¾	5,658¾	3.1
1907	..	..	2,264	5,028	2.2

Live Stock.

			On 31st Dec., 1907.	1906.
Horses	..	..	113,117	104,922
Cattle	..	..	759,046	690,011
Sheep	..	..	3,694,852	3,340,745
Pigs	..	..	53,122	56,203

DIRECTOR OF AGRICULTURE.

Professor William Lowrie, at present Director of the Lincoln Agricultural College, Canterbury, New Zealand, has received the appointment of Director of Agriculture in this State and will take up his new duties at the end of the present year.

Born on a farm at St. Boswell's, Roxburghshire, Scotland, Professor Lowrie was educated at Edinburgh University, where he gained degrees of M.A. and B.Sc. with honours. He was afterwards lecturer in Natural Science and Agriculture at Gordon's College, Aberdeen, and on his arrival in Australia took up the position of Professor of Agriculture and Principal of Roseworthy College in South Australia, which he held from 1887 until he resigned to proceed to New Zealand in 1901. Professor Lowrie's father is engaged in agricultural pursuits in the southern districts of Western Australia.

SHARE-FARMING.

A considerable number of farms in New South Wales, and particularly large ones, are worked on the "Shares" system, which is described in the following manner in the *June Agricultural Gazette of New South Wales*:—

Under this system a farmer possessing the necessary team and implements arranges with the land-holder to crop a certain area for a season, or for a number of seasons. The usual form of agreement provides that the landowner shall provide land, seed, two-thirds of the manure (where manure is used), and bags for his share; the farmer on his part must perform all the operations of cultivation and harvesting in a workmanlike manner, and at seasonable times, using his own plant for the purpose; he must also provide one-third of the manure (where manure is used), and bags for his share. Up to a specified yield of crop, the owner and farmer take equal shares; any excess becomes the property of the farmer, as a bonus to encourage good and thorough farming. Special arrangements are often made to suit local conditions. This method of working large areas is invariably a success where the arrangement is drawn up on a truly co-operative basis, and is one of the most satisfactory ways of working large estates. At "Landra," the birth-place of this system in New South Wales, some 18,000 acres are planted on the share system. Share-farming is admittedly not so desirable a condition as that in which every man farms his own land, but such a system is one by which large properties can be successfully handled, and one by which a man who has no land of his own may accumulate enough means to buy some. That it has done this is proved by the cases of farmers who now have comfortable properties of their own, but who commenced as share-farmers. To reputable, suitable men without capital or plant, some landowners have advanced sufficient capital to enable the men to buy plant and make a start. In some cases the owner places a price on the land, and gives the share-farmer the option of purchasing his area at that price after five years.

THE ROYAL AGRICULTURAL SOCIETY'S SHOW.

Encouraged by the phenomenal success in the past, the Royal Agricultural Society is strenuously endeavouring to make the 1908 Show eclipse all its predecessors. The Show will be held on October 20, 21, 22, 23, and 24th. *The entries closing on October 5th.* Anyone desiring information can obtain a schedule of prices from Mr. Theo. R. Lowe, the secretary, at the office, 31 William Street, Perth. The prizes offered for the forthcoming Show amount to £1,682. The general interest already being manifested concerning the fixture leads one to think that the 1908 Show will be something to be proud of.

What promises to be one of the big successes of the next Show is the draught mare class, which we have good reason to believe will be the strongest one on record—and this class has never been a weak one. The Australian-renowned mares lately purchased at Mr. Gibson's dispersal sale in Victoria and imported here by Mr. Robert Carroll for Messrs. Wills and Co. will be exhibited. One of these mares, it will be remembered, won the championship of Scotland at the Highland Society's exhibition of the year she was imported to Victoria by Mr. Gibson, and holds an unbeaten Australian record for her class. We have it upon good authority that among other new mares to the Royal ring which will compete against Lady White, the mare referred to, are animals which hold severally among their wins the championships of New Zealand, Melbourne, Sydney, and Adelaide. Such being the case, the class must be a most attractive one, and it will be interesting to see how Mr. T. H. Wilding's as yet unbeaten mare Deborah comes out of the comparison with mares possessing such high records.

It is needless to say that the stallion class in draughts will be a good one, and at least three animals new to the State will come into the ring. Admirers of that sterling old horse Royal Blue are predicting his return to the first position, from which he was ousted last year for the first time in his long showyard life, owing to temporary lameness. In the sheep classes merinos are certain to make a big show, and considerably in excess of last year's entries. There is going to be quite a lot of new sheep of this breed shown by new exhibitors. The correspondence which is coming in reveals that fact. A noticeable feature of the sheep sections will be the altered position which will be occupied by the Romney Marsh. This breed is coming along by leaps and bounds, and it is stated on unquestionable authority that instead of two exhibitors as at last Show there will be seven or eight, who have among them a large number of very high-priced imported animals. We imagine that at the forthcoming Show the Romney Marsh will come next in point of strength to Shropshires, which will be a remarkable bound ahead for the breed.

The machinery exhibits, which furnish such a splendid object lesson to the farmer, will be very extensive, and all the popular features will be in evidence on a large scale.

USEFUL KNOTS.

(*Agricultural Gazette of N.S.W.*)

Every farmer uses ropes for some purpose, either for tying on loads or in connection with his stock, but it is seldom that one sees the most suitable



Fig. 1.—Reef knot.

knots employed. A good knot should be easy to undo—that is, it should not jamb when a strain is put on it, nor should it become fast when wet. There

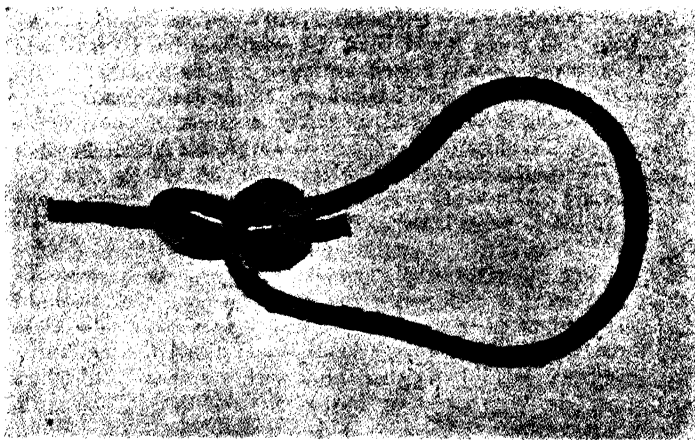


Fig. 2.—Bowline.

are so many knots employed by sailors, that to refer to a work on knots and cordage is almost bewildering, and many of the knots shown in such works

are purely of a fancy nature. For the purpose of simplifying the matter, a few of the more useful and easily-tied knots are here shown. These are all

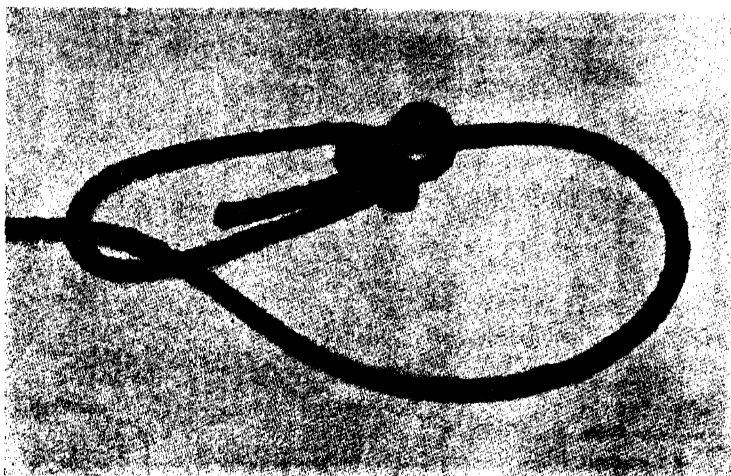


Fig. 3.—Running bowline.

easily tied, and were tied and photographed specially with the view of showing clearly how it is done. For this reason they are not pulled up tight, but were just tied loosely, so as to show as clearly as possible how the ropes “lay” over one another.

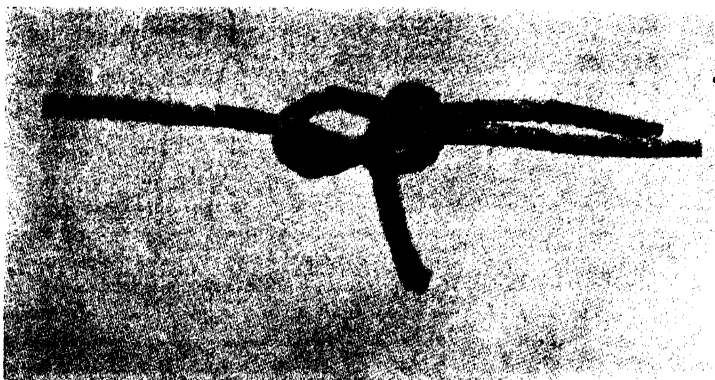


Fig. 4.—Becket, or sheet band.

There are two knots that stand out as useful knots above all others, and these are the “reef” or “square” knot and the “bowline.” The reef knot

(Fig. 1) is the best knot for most purposes; where it is necessary to join two ropes, it will not jamb except when the rope is very thin.

The bowline (Fig. 2) is a very useful knot indeed, and is quite safe; it cannot possibly slip, and for this reason is a suitable knot to use for tethering

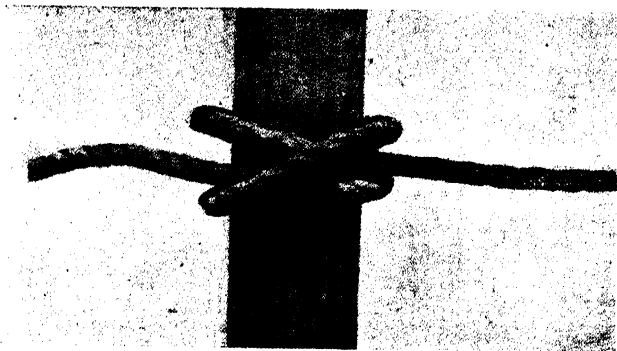


Fig. 5.—Clove hitch.

stock. If a running loop is required, the running bowline (Fig. 3) is a good form, as the loop will not pinch on the rope and give trouble when in use.

The plain, becket, or sheet bend (Fig. 4), is another useful knot for joining two ropes—especially when one end runs up to, and stops at, a pulley-block, there is no loose end to feed into the block and jamb it.

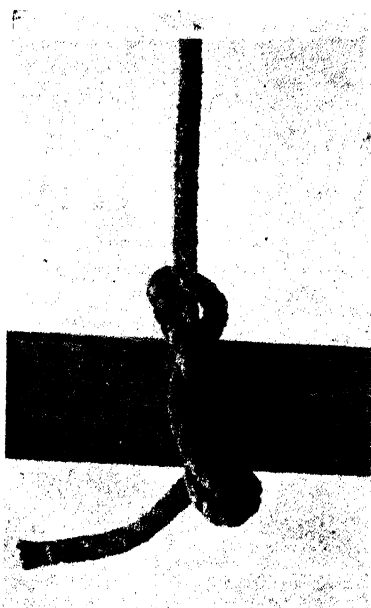


Fig. 6.—Timber hitch.

The clove hitch (Fig. 5) is also a useful knot for use with poles and guys. It will not slip in either direction, and is easily undone.

It sometimes happens that there is some building or well-sinking going on on the farm, so it is just as well to know how to make a timber hitch—this is shown in Fig. 6. This knot can be combined with a half-hitch by passing the fall of the rope round the spar, say, 2 feet along its length and back under itself. This makes a good hitch for lowering timber down a shaft or well. This is shown in Fig. 7. It can be made additionally safe by putting in another half-hitch another 2 feet along the spar.

Sometimes it is desirable to reduce the length of a rope without undoing the ends; when loading, for instance, the ropes may be reduced in length by

means of the sheep-shank previous to putting in twitches. There are many times when it is handy, and it is very simply tied. It is shown in Fig. 8, but it is far easier to tie than it looks.

For tightening ropes over loads of hay, straw, lucerne, green stuff, and other springy loading, no means is so rapid as the one shown in Fig. 9. The fall is taken through a ring or round the guard-irons of the dray or waggon. A loop in the bight is grasped in the hand, and a half-hitch is made round the end of the loop higher up the bight; the end of the fall is then passed through

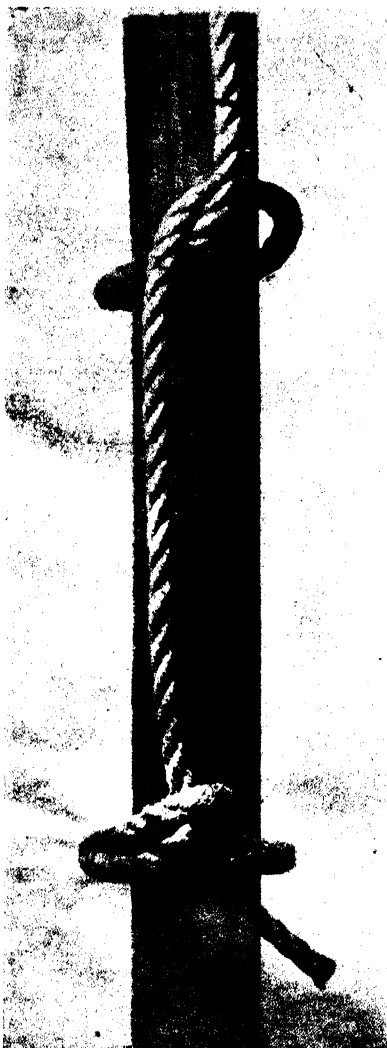


Fig. 7.—Timber hitch with half-hitch.

tight and thus keep the load quite firm.

by putting more than one such loop in—a



Fig. 8.—Sheep shank.

the loop thus made, and used as a pulley-block or snatch block. It is a little bit rough on the rope pulling it through the loop, but it enables the rope to be drawn very tight. It is possible to extend this system by putting more than one such loop in—a second, or even a third, can be put

in the fall in succession. But for all ordinary purposes one is enough. If the load is going any distance, the twitch method, using sticks, is better.

The too common knot generally called the granny is shown in Fig. 10. (This knot is easier to tie, and far harder to undo than a reef or square knot, yet it is the usual knot tied by the inexperienced. To some people the granny knot comes natural—the knot is liable to slip; it is frequently used by shop assistants to tie parcels, probably with the object of increasing sales. The best

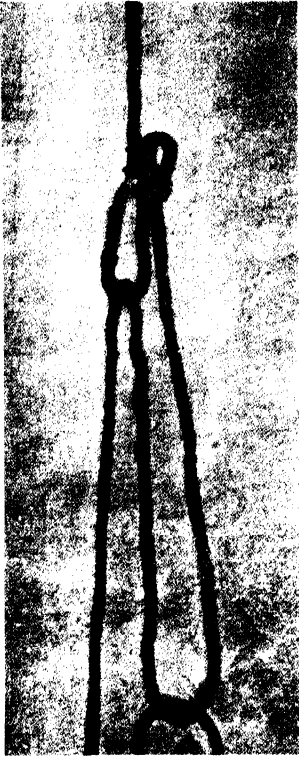


Fig. 9.



Fig. 10.—Granny knot.

way to untie a granny knot is to—cut the rope. Of course, there are many very useful knots not shown, but because they are not shown is not to say they are useless, or merely fancy knots, for such is not the case; but those shown may be considered a few of the most useful, simple knots in general use.

CORRESPONDENCE.

PRICE OF EGGS.

Mr. R. H. Lawton enquires: "Could you kindly inform me at your earliest convenience what the annual average market price of eggs has been for the past three years?"

Mr. Robertson, Poultry Expert of the Department, supplies the following information:—"A large poultry farmer gave me 1s. 6d. per dozen as his average price from 1st January, 1906, to 31st December, 1906. The Narrogin Competition eggs from 1st May, 1906, to 30th April, 1907, were 1s. 6d. per dozen. The Subiaco Competition prices from 1st January, 1907, to 30th June, 1908, averaged 1s. 5¼d. per dozen.

In my poultry notes of July, 1903, the average wholesale price for the previous twelve months was stated to be 1s. 10d. per dozen. Between that date and January, 1906, I have no figures on the subject, but the price has been gradually declining since then, and judging by the average price of the last Subiaco Competition, it is still receding."

SHEEP-DIPPING—SELF-ACTING TIP.

We are in receipt of the following letter, dated August 5, and sketches from Mr. Tom Carter, of "Wensleydale," Broomehill:—

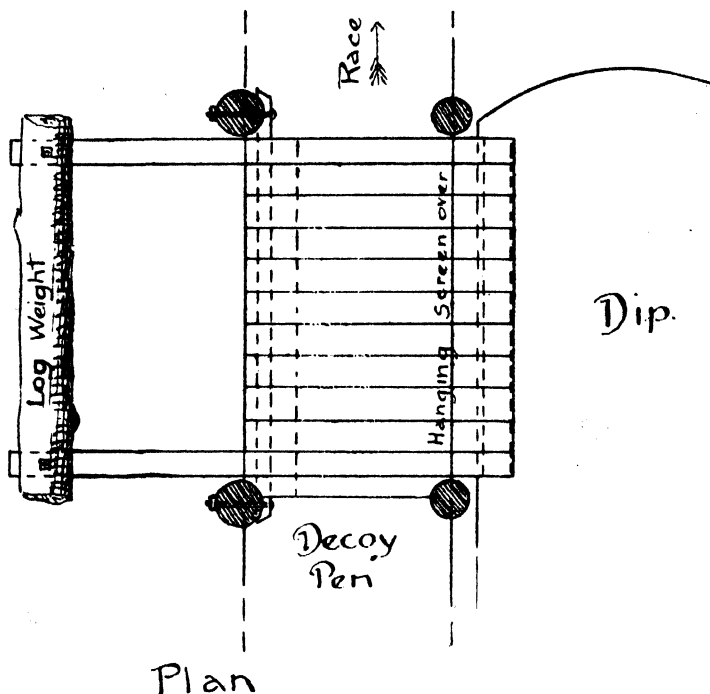
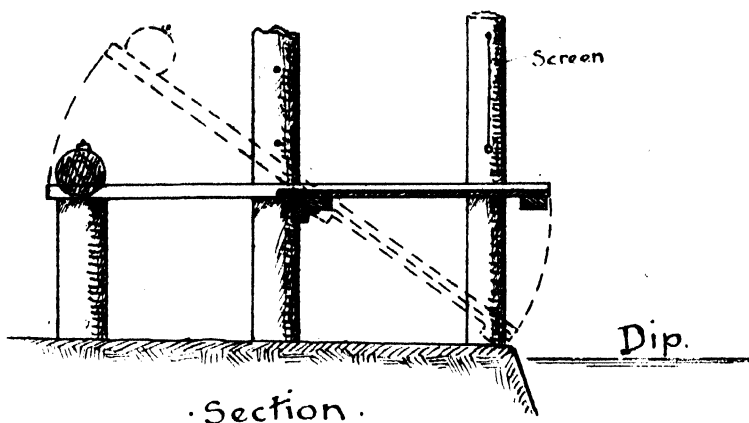
"Seeing in your issue for July last, plans of sheep-yards, dips, etc., I venture to send you plans of a self-acting tipping board for dipping sheep, which I fixed up on my dip last season, and found it to answer remarkably well, as all the sheep, including old ewes, which know what dips are, readily went on it. Sheep which have been dipped once usually balk to a great extent as soon as they reach the edge of the ordinary fixed inclined plane, but as this hinged tipping-board returns to a horizontal position after the passage of each sheep, they step freely on it, thinking to reach the decoy-pen on the other side without any hindrance.

"I think the diagrams here shown will explain the construction, which is very simple. It is made of 6in. x 1in. tongued and grooved jarrah flooring boards, with edgings of 4in. x 2in. nailed on top of the side boards. These edgings keep the sheep from getting either their fore or hind feet off the board. The log weight at the outside ends of the side pieces can be regulated according to weight of sheep to be dipped. My board was so fixed as to tip down with a 40lb. weight in the centre, and all my sheep, including weaners, were dipped without altering it.

"The tip, of course, is placed between the end of race and decoy-pen. On the side nearest the dip a screen is hung from its top edge. If the larger sheep hit the lower edge of this screen on their passage under it into the dip, it at once swings back and keeps the following sheep from seeing what has become of its predecessor.

"The tip board is fastened by a pair of strong butt hinges, placed upside down. One half of hinges is screwed to a piece of 4in. x 2in., which

piece is bolted on to two strong posts. The other halves of hinges are screwed to a piece of 4in. x 2in., which in turn are fastened on the under



side of the tip-board. The piece of 4in. x 2in., reaching between the two posts, must be fixed by the hinges to the tip-board *first*, and then bolted to the two posts.

"A pair of stout posts, with tops sawn off square, should be sunk in the ground, so that the two 4in. x 2in. side pieces of the tipping-board come squarely down on them, which takes the strain off the hinges as the board comes back to the level."

GREEN MANURES.

The growing of crops for green manure is recommended as a means of supplying humus and certain other food constituents to the land. They are allowed to grow until they have gathered from the soil almost the whole of the matter they are capable of gathering—that is to say the plants are left until they are full-grown, yet green, generally about the flowering period, and then ploughed under. By operating in this way the land is manured with everything that the plants have accumulated, either from the air or from the soil, or from the water in the soil; and there is thus incorporated with it a mass of soft, fresh, succulent organic matter, which speedily enters into fermentation, and causes the soil to ferment also, while enormous quantities of carbonic acid are given off to disintegrate and dissolve the component parts of the crude soil.

How Nature Works.

We have a somewhat similar method of concentration going on continually around us, by which fertile loams have been accumulated on the earth's surface, for the roots of trees and plants work unceasingly to bring up plant food from the subsoil, while some of them take in food from the air, and this is deposited in easily assimilative forms on the surface of the land by the leaves that fall, and the plants when they decay. The organic matter thus incorporated with the soil will furnish an abundant supply of humus of absorbing and retaining moisture, for supplying nitrogen, for encouraging useful fermentations, and for improving the texture of the land.

When and what to Plough under.

The farmer who ploughs up a paddock covered with grass or weeds is, though perhaps unconsciously, ploughing under green manure. Green manure crops of any description should be turned under in sufficient time to allow of thorough decomposition and incorporation with the soil before planting operations commence. The length of time depends upon the weather—it is most rapid when the soil is warm with plenty of moisture, and least when cold and dry. There are many classes of plants that may be used for this purpose, selected according to the length of time they occupy the ground, the season of growth, suitability of climate, and richness of plant food ingredients.

Where crops can be grown, and used for feeding purposes, a double return can be secured; among these may be mentioned rape, mustard, peas, clovers and others. The practice of growing these and grazing them off by stock is one that can be highly recommended. A return is assured from the food consumed by the stock, and the amount of vegetable matter they waste, together with their droppings, will still add fertility to the soil. The best of all plants for green manuring are those of the leguminous family, *i.e.*, peas, beans, vetches, etc. Although four-fifths of the atmosphere consists of nitrogen—and this is so essential to the proper development of plants—only the leguminous family are able to make use of it.

It has been discovered that certain kinds of bacteria enter the roots of leguminous plants from the soil, form colonies within the roots, and the lumps which you may observe on examining the roots of one of these are formed by the simultaneous development of the bacteria, and of the vegetable cells in the root—that is to say, by the reactions of the cells and bacteria one upon the other. It has also been shown that both the bacteria and the plant itself derive profit from the reactions: for, while the bacteria feed upon the plant, and derive most of their food from substances formed within it, they do also obtain nitrogen from the air, and a part of it thus collected is consumed and put to profit by the plant, which in this way feeds upon, or through, its own parasite.

The practical result of this symbiotic growth is that the micro-organism on the leguminous root takes free nitrogen from the air, and assimilates it in such a manner as to form fit food for the plant, which readily partakes of the food thus offered, and derives great benefit from it.

The shading of the ground also brings the soil into a favourable condition of fermentation, whereby useful chemical actions are induced and maintained, at the same time that good physical conditions are assured. It must be borne in mind, however, that those plants that shade the land most are those which pump the largest amount of moisture out of the lower layers of the soil, and tend to leave it so dry that succeeding crops may suffer. This dryness any farmer will have observed in ploughing up a piece of land covered with summer-grass. It is, therefore, necessary to grow these crops and turn them under some time before the time to sow, that they may be thoroughly decomposed, and that moisture may be accumulated from rains and from subsoil moisture.—*Farmer and Settler.*



On the Rabbit-proof Fence.

1. Track North of Gabyon Station. 2. Boundary-rider.



On the Rabbit-proof Fence.

3 and 4. Agricultural land. 5. End of fence on sea-coast.



On the Rabbit-proof Fence.

6. Crew's station - No. 1 Fence. 7. Boundary rider's shelter.
8. Pastoral country (unoccupied).

ALONG THE RABBIT-PROOF FENCE.

When Mr. Alex. Crawford, Chief Rabbit Inspector, goes on his tour of inspection on the route of No. 3 Rabbit-proof Fence, he supplies himself with snap-shots of many spots in its vicinity. The accompanying illustrations are a few products of his camera.

The first is a view to the north of Gabyon Station. In wet weather the track is almost impassable for vehicles. There is good sheep country, with plenty of mulga and salt-bush.

No. 2 shows a boundary-rider. This out-back servant of the State has about 70 miles of fencing to look after and inspects the whole every six days.

No. 3 gives an idea of what good agricultural land is near No. 3 fence. Sooner or later this land will be taken up for cultivation; whilst from

No. 4 we see more good agricultural land fit for mixed farming.

No. 5 shows where the fence joins the Indian Ocean at Bluff Point, about 20 miles south of the mouth of the Murchison River.

No. 6 is Mr. Crew's cattle and sheep station on the No. 1 fence, about 200 miles north of Burracoppin.

No. 7 is a boundary-rider's temporary shelter on the No. 1 fence.

No. 8 illustrates the large area of unoccupied pastoral country to the east and west of No. 1 fence, north of Burracoppin.

GYPSUM DEPOSITS NEAR PINGELLY.

In May last Mr. A. G. Hewby, an Inspector of the Agricultural Bank, forwarded to the Department samples of gypsum deposits, which were discovered in the neighbourhood of Pingelly. The samples were obtained from C.P. Block 8777, Avon District, owned by Mr. F. Johnson, and which adjoins White Water Lake, westward of Lake Nonalling and a few miles north of Lake Yealering, distant about thirty-five miles E. by S. from Pingelly.

The deposit is stated to show on a surface indication for a length of six chains with a width of half to three-quarters of a chain, whilst the depth of the strata has not been ascertained. The locality is in proximity to the projected Wickepin line of railway.

The three samples were analysed by Mr. E. A. Mann, Government Analyst, whose report was as follows:—

No. 1 sample contains 31.48 per cent. gypsum.

No. 2 sample contains 47.66 per cent. gypsum.

No. 3 sample contains 30.71 per cent. gypsum.

This analysis does not show so good a percentage as is given by gypsum procured in other localities, but it will, however, be eminently useful as dressing for land in its vicinity, and where cartage will not prove a serious item.

TICK PARASITE.

Officials of the Bureau of Entomology of the United States Department of Agriculture have discovered that certain kinds of stock-infesting ticks in Texas are subject to the attack of an internal parasite, and have signified their willingness to assist in getting this beneficial creature established elsewhere. In its adult stage the parasite (*Ixodiphagus tetanus*) is a tiny winged insect somewhat similar in appearance to the parasites which most commonly affect scale insects. It is not known yet whether or not it attacks the very common cattle tick of Texas, which is closely allied to the so-called Blue Tick of South Africa, but it has been bred from kinds in the same genera as the Dog Tick and the Brown Tick. No other true parasite of ticks has anywhere been discovered.—*Agricultural Journal of Cape Colony*

The Under-Secretary of the W.A. Department of Agriculture, recognising the importance of the information contained in the above paragraph, has communicated on the subject with Mr Compere (the Government Entomologist), who is at present in Hong Kong, and also with the Washington Agricultural Department for full particulars of the parasite referred to, with a view to its introduction in this State for experimental purposes in the province of East Kimberley.

NITROGEN-FIXING BACTERIA.

During the year 1906-1907 cultures of nitrogen-fixing bacteria for inoculating leguminous crops were supplied by the Public Health Department to the Department of Agriculture—six from July to December, and one from January to June. Reports have been received as to the results from two of those supplied—in one case no difference was noticed between the inoculated crop and others in the district, in the other the applicant spoke very highly of the results and is inoculating his crop again this year. In July, 1907, a new and more simple method was attempted for distributing nitrogen-fixing bacteria, consisting of pounding up the nodules in sterile dry soil, leaving them one week in a plugged sterile test-tube to dry and then distributing them in sterilised rubber-corked glass bottles. Seven cultures have been thus supplied during the year 1907-1908. Messrs Nicol Bros report as follows on tubes supplied in July, 1907—"The cultures were used to inoculate peas which were planted in a place where nodules had not been noticed before and peas would not come to perfection (two years trial). Peas planted now show good growth and plenty of nodules." Messrs. Nicol again applied in June, 1908, for a further supply.



Bunch of Root Fungus.
One-third natural size.

ANALYSES OF HARVEY SOILS.

Mr. E. A. Mann, Government Analyst, reports as follows on results of analyses of samples of soils from the Harvey district affected with fungoid disease.

"The results may be summarised as follows:—

"Speaking generally (there are only one or two exceptions), the soils show a deficiency in available Phosphoric Acid though the *total* phosphates are fairly good; they are acid and show superficial accumulation of salt. The proportion of salt present, though not very high, is nevertheless in most instances bordering on, or in excess of, the maximum (.03 Chlorine) which a good soil should contain.

"The subsoils are low in salt showing a surface accumulation. Actively deleterious salts are absent, but I think the facts above are sufficient to go a long way towards an explanation of the difficulty which has been encountered.

"The trouble is lack of drainage—the above conditions are those incidental to lack of drainage and consequent insufficient aeration of the soil. Lack of phosphates and drainage have combined to make the plants susceptible to disease besides giving the fungus a favourable environment."

GOVERNMENT LABOUR BUREAU.

OPERATIONS DURING LAST MONTH.

The following report on the operations of the Government Labour Bureau during last month is to hand from the Superintendent (Mr. James Longmore):—

Perth.

Registrations.—The total number of men who called during the month in search of work was 855. Of this number 547 were new registrations and 308 renewals, *i.e.*, men who called who had their names registered during the month of July. The trades or occupations of the 855 applicants were as follow:—Labourers, 333; handy lads, 77; handy men, 63; farm hands, 62; cooks, 37; carpenters, 31; bushmen, 20; miners, 20; gardeners, 17; grooms, 13; clerks, 11; drivers, 10; butchers, blacksmiths, and engine-drivers, 9 of each; painters, 8; hotel hands, 7; yardmen, 7; station hands, 6; shearers, 6; bricklayers, caretakers, kitchenmen, plumbers, strikers, and teamsters, 5 of each; firemen, 4; bakers, engineers, fitters, orchardists, and printers, 3 of each; and 51 miscellaneous.

Engagements.—The engagements for the month number 269. The classification of work found was as follows:—Labourers, 111; farm hands, 30; handy lads, 21; bushmen, 20; handy men, 20; fencers, 8; cooks, 7; sawmill hands, 7; lads for farms, 6; carpenters, 4; dairymen, 4; miners, 3; and 28 miscellaneous.

Kalgoorlie.

Registrations.—The new registrations were 24 and renewals 16, classified as follow:—Handy men, 15; labourers, 8; yardmen, 4; carpenters, 3;

handy youths, 3; clerks, 2; fitters, 2; engine-drivers, fireman, and grocers, 1 of each.

Engagements.—The engagements were four, viz., blacksmiths, fitters, handy men, and labourers, one of each.

The female servants who called at the bureau numbered 12. The classification was as follows:—Generals, 4; waitresses, 3; laundresses, 2; housekeepers, 2; and cook, 1. There was one engagement—a general.

Women's Branch, Perth.

Registrations.—There were in connection with this branch 116 registrations and 56 renewals; total, 172. The classification was as follows:—Laundress-charwomen, 34; cooks, 29; generals, 25; housemaids, 20; light generals, 17; housekeepers, 14; waitresses, 9; useful girls, lady helps, and nursemaids, 5 of each; nurse-needlewomen, 3; and 6 miscellaneous.

Engagements.—The engagements numbered 64. The classification of work found was as follows:—Laundress-charwomen, 30; generals, 13; light generals, 5; housemaids, 4; cooks, 3; and 9 miscellaneous.

General Remarks.

The number of individual men who called at the Central Office, Perth, during the month for work was 855; compared with the month of August last year the total shows an increase of 114. The engagements for the month numbered 269, which is 27 beyond that for the corresponding month of 1907. One hundred and eighty-five of the 269 found employment in the country, and 84 in town.

Country engagements during the past eight months reached 2,140, which is 968 in excess of the total for the corresponding eight months of 1907. Of this increase private employers were responsible for 604, and work found by the Government 364.

PUBLICATIONS RECEIVED.

— — —

- Bulletin of Haarlem Colonial Museum (July).
- Longevity of Seeds (A. J. Ewart), Royal Society of Victoria.
- Report, Hong Kong Botanical and Forestry Department, 1907.
- Statistics—Trade and Interchange—New Zealand, 1907
- Bark-boring Beetle attacks, Simla, India.
- Glossary of terms used in Indian Forestry.
- Fruit-drying for beginners—S.A. Bulletin.
- Improvement of Cereals—S.A. Bulletin.
- Preparation of small clips for market—S.A. Bulletin.
- Banded Pumpkin Beetle—S.A. Bulletin.
- Review of Wool Season—S.A. Bulletin.
- Harvest Report, Roseworthy Agricultural College—S.A. Bulletin.
- Dry-farming in America: Report—S.A. Bulletin.
- Reclamation of land—S.A. Bulletin.
- Gumming disease of peach trees—S.A. Bulletin.
- Report on Agricultural Education, England and Wales.

MARKET REPORTS.

GENERAL SUMMARY.

FARM PRODUCE.

During the month the tone of the local markets has varied, with a lowering tendency as regards farm products. This has been more noticeable in respect to chaff, chiefly affected by quality; wheaten chaff has had good yardings, and prime green wheaten, which has been of limited quantity, has maintained good prices. Prices for eaten chaff have ranged from £3 17s. 6d. to £4 5s. for inferior, £5 5s. to £5 7s. 6d. fair quality, and £5 7s. 6d. to £6 5s. and £6 10s. good medium. Wheaten: Prices varied from £3 5s. to £6 7s. 6d.; £5 15s. to £6, and £6 2s. 6d. f.a.q.; some lines of prime green reaching £7 2s. 6d. Heavy supplies of straw fetching from £1 12s. 6d. to £2 5s.

In the grain market, wheat supplies were limited, quotations verging between 3s. 10d., 3s. 10½d., and 3s. 11d. Oats, quoted at auction, at 3s. 3d. to 3s. 3½d.; ex-store, 3s. 5d., 3s. 6d.; crushed, 3s. 8d., 3s. 8½d., and 3s. 9d. Flour, truck lots on rail, £9 12s. 6d. Bran and pollard, £7 10s.

LIVE STOCK.

Live stock markets exhibited a generally satisfactory feeling, country sales being well patronised and prices good for useful stock.

Cattle: Fat bullocks, £7 12s. 6d.; cows, £5 5s.; store bullocks, £6; young steers, £4 12s. 6d.; cows, £4 5s.; heifers, £3 10s. and £2 7s.; calves, 12s. 6d.

Sheep: Mixed ewes up to 17s. 9d.; lambs, 11s. 6d.; light fat sheep, 14s. 6d.; fat wethers to 18s. 6d.; with lambs, 18s.; hoggets, 13s.; stores, 16s. 6d. Pigs have sold at profitable prices: Porkers fetched up to £2.

FRUIT AND VEGETABLES.

Fruit has maintained firmness, and supplies have met demands. The position of the market has on the whole been as follows:—

Apples: Rome Beauties, dumps, 10s. to 12s. 6d.; do. flats, 9s. 6d. to 13s. 6d.; do. Nickajacks, 11s. 6d. to 13s. 6d.; Cleopatras, 9s. 6d. to 13s. 6d.; Stone Pippins, 7s. 6d. to 9s. 6d.; Dunn's Seedlings, 9s. to 11s. 6d.; Rokewoods, 10s. to 13s. 6d.; Five Crowns, 7s. 6d. to 11s.; other varieties, 7s. 6d. to 10s. 6d.; medium and inferior, all kinds, 6s. 6d. to 8s. 6d. Oranges: Navels, dumps, 10s. 6d. to 14s. 6d.; flats, 8s. to 13s. 6d.; medium, 6s. 6d. to 7s. 6d.; ordinary oranges, dumps, 8s. to 11s. 6d.; flats, 5s. 6d. to 8s.; medium and inferior, 4s. to 5s. 3d. Mandarins: 10s. to 16s. 9d.; medium, 6s. 6d. to 9s. Lemons: Best, 5s. 6d. to 7s. 6d.; large, 3s. 9d. to 4s. 6d. Cabbages: 3s. to 6s.; others, from 1s. 3d.; Savoys, 3s. to 6s. 9d. Cauliflowers: 2s. to 3s. 6d.; others, from 6d. to 1s. Pumpkins: Ironbark, 3s. 9d. to 6s. 3d.; inferior, 1s. 6d. to 2s.; bugle, 3s. 3d. to 4s. Peas: 4½d. to 4¾d. Carrots: 1s. 6d.; 2s. to 2s. 3d. Parsnips: 1s. to 1s. 7d.; small, from 5d. Turnips:

5d. to 9d. Beet: 1s. to 1s. 4d. Swedes: 8d. to 1s. 5d.; small, from 5d.; bulk, 4s. to 5s. Celery: 1s. to 3s. Lettuce: 1d. to 2½d. Rhubarb: 1d. to 2½d. Leeks: 6d. Potatoes: country (new), 16s. to 18s. 9d.

POULTRY, ETC.

Poultry in demand and market firm.

Best table birds: 7s. to 8s. 6d.; medium, 5s. to 6s. 6d.; hens (laying), 5s. to 7s.; medium, 3s. 6d. to 4s. 9d. Ducks: best young fats, 6s. 6d. to 8s.; medium and Indian Runners, 4s. to 6s. Turkeys: Gobblers, best, 16s. 6d. to 24s.; medium, 14s. to 17s. 6d.; hens, 9s. to 12s. 6d. Geese: 9s. to 11s. 6d. Guinea fowls: 4s. 6d. to 6s. Pigeons: 1s. 8d. to 1s. 10d. White Leghorns: Hens, 6s. 6d. to 9s. 6d.; pullets, 6s. to 8s. 6d. Buff Orpingtons: Pullets, 6s. 6d. to 8s. 6d. Black Orpingtons: to 8s. 9d. Minorcas: 6s. 6d. to 8s. 6d. Brown Leghorns: 6s. 6d. to 8s. Silver Wyandottes: 6s. 9d. to 8s. 6d. White Wyandottes: 7s. to 9s. 6d. Cockerels: all kinds, 6s. 6d. to 12s. 6d. per pair.

PROVISIONS.

Eggs: Locals, 1s. 1d.; country, 1s. Pork: Prime, 6¼d. to 6¾d. Carcase Mutton: 5d. to 5¾d.; do. Lamb, 6d. to 6¼d. Honey: Best clear, 11s. to 12s. 6d.; medium and dark, 9s. to 10s.

LONDON PRODUCE MARKETS REPORT.

Messrs. W. Weddel & Co. report as follows under date, London, July 31:

Wool.—Since our last report upon the opening of the present sales, the tone of the market has been, in general, good. Under strong American competition during the first week, crossbreds stiffened perceptibly, the light conditioned lots selling very often at an advance of 15 per cent. to 20 per cent. over May rates. However, towards the middle of the second week the Americans seemed to drop out a little, and this had the effect of weakening prices, and with bad reports from consuming areas, the Home trade lowered their prices to the extent of ½d., at which level competition was quite well maintained.

Scoured crossbreds, on the other hand, are selling irregularly at a 5 per cent. decline from May. Slipes were fairly well represented throughout, but they, too, showed a little weakness towards the close. Merinos always met a good market, but, while the superior greasies show no change, medium sorts are about 7½ per cent. dearer than in May. Good combing scoureds, which sold indifferently last sales, now sell well, and are 7½ per cent. above May rates, while short kinds and skin wools are just the turn dearer.

Offerings up to 30th inst. comprise some 200,700 bales, including 83,100 bales from New Zealand, 93,800 bales from Australia, and 14,100 bales from South America. About 185,700 bales were sold, of which 77,400 were of New Zealand, 87,200 of Australian, and 14,000 of South American origin.

Grain.—Wheat, etc.—The demand has been decidedly better during the past fortnight, and, although the market could not be called active there has been a steady trade at improving prices which, at the close, are 1s. 6d. to 2s. per qr. higher for wheat than they were a fortnight ago.

At the close the market is firm, with an improving tendency for near positions.

English Wheat.—Offerings on the country markets have been fairly liberal, but values have been maintained, viz., 33s. to 35s. per 504lbs. delivered. The average price last week, however, of 31s. 5d. per imperial qr. marks an advance of 1s. per qr. from the previous fortnight, but is 1s. 6d. per qr. lower than at the same time last year.

Australian Wheat.—*Ex Store.*—There is only a quiet demand for this, and values are easier. We quote: 38s. to 39s. per 496lbs.

Frozen Meats.—General Market.—There has been a fair demand at Smithfield during the past fortnight. Quotations for home-grown mutton are about maintained at 7d. (*or* 8d. for Scotch, and 6½d. to 7d. for English. The market for chilled beef is comparatively steady at a moderate level of quotations. At Smithfield, States side are realising 5¾d. (*or* 6¼d. per lb., and Canadian sides 5½d. (*or* 6d. per lb.

Mutton.—Australian.—Receipts during the past two weeks amount to 11,077 carcasses. The small quantities of Australian mutton on offer are not in demand even at prices ½d. to ¼d. below current rates for River Plate sheep. Small carcasses cannot be quoted at more than 3¼d. per lb., medium weights are offered at 3d. (*or* 3½d. per lb., and for heavies 2½d. (*or* 3d. is the present price.

Lambs.—Arrivals during the fortnight amount to 8,606 carcasses from Australia; 197,997 carcasses from New Zealand; and 25,332 carcasses from the River Plate. As is usual at this time of the year, small lambs are somewhat scarce at Smithfield, the Provincial markets absorbing large quantities of that description. Consequently all the medium and heavy weight carcasses have to be disposed of on the Smithfield market, and most holders being rather overstocked with lambs of these weights, for which there is only an extremely slow demand, the market has given way considerably, holders exhibiting great anxiety to sell at best prices obtainable. The few Australians available are realising 4½d. (*or* 5d., according to weight.

RECIPES.

"Fly-blow" on Sheep.—A few drops of fish-oil sprinkled on the wool in the vicinity of the tail will prevent attacks of flies throughout the season. The fetid aroma of the substance will persist for months, and the disagreeable, penetrating odour increases the longer it is kept, on account of the development in it by oxidation of the oil of a substance called valerianic acid.

Mange on Horses.—Wash with softsoap and warm water. Apply following dressing:—Quicklime, 1lb.; sulphur, ½lb.; water, 1 quart.

Mix the lime and water first, then add the sulphur, stirring the mixture until it is a uniform grey colour. Boil gently over a slow fire, stirring constantly until the ingredients are combined. Allow the mixture to settle and pour off the clear fluid, which is to be used as directed. Wash off in three days and re-apply if necessary.

GARDEN NOTES FOR OCTOBER.

By G. CHITTY BAKER.

The month of October is generally considered the busiest of all months so far as garden operations are concerned. Fine weather is now the general thing, the only fear is the one or two late frosts that sometimes occur this time of the year, and when they do they prove most disastrous. It will be remembered that it was towards the end of October last year that we got two or three very severe frosts that played great havoc with all fruit blossoms, so much so that at least 75 per cent. of the blossom of stone fruit failed to set. Besides this, very large quantities of garden stuff were destroyed. It is as well to bear this in mind so that protection may be given to such plants as tomatoes, melons, cucumbers, etc., all of which should now be making good growth.

The past winter may be considered to have been rather a dry one, the last three months each registering an inch under the average rainfall. As the annual rainfall varies but very little, we may expect the shortage to be made up during this and the next two months following. This being so, it will give us a little more than the average for the last three months of the year, and every advantage should be taken of it by planting largely during the whole of this month. Always remember, that from now on, to well work the surface of the ground immediately after a down-fall, and so conserve the water in the ground as long as possible. If this is adopted it ought not to be necessary to apply water until the end of the year at least. With a fall of two or three inches of rain during October, I have always managed to keep sufficient moisture in the ground, and save the trouble of watering until the end of January. The value of thus retaining the moisture in the soil cannot be over-estimated, while so few realise the great importance of having a store of moisture in the ground, or the advantage and gain such a store is as against the value of the water when applied by means of hose or watering-can.

If the advice given last month has been acted upon, a number of crops should now be showing up well, which must be kept clean and free from weeds; do not allow any young plants to be checked, for if once this happens, you can never hope for success, for plants once checked can never recover sufficiently to produce good results.

Amongst the crops to receive attention, the following should be cultivated:—

Artichokes (Jerusalem) can be sown, although those sown earlier will, no doubt, give the best yields. The pieces of tubers may be planted out the same as potatoes, and they give a good yield.

Arrowroot.—Bulbs may still be planted out. The plant is both ornamental and useful. The bulbs or tubers, when cooked, make excellent feed for pigs. Plant in drills about four feet apart and two feet apart in the drills and manure well.

Beans.—French or kidney, snake, haricot, scarlet runners, etc., may all be planted out in large quantities. Beans are one of the most profitable vegetables, and can be obtained in Perth almost all the year round. Plant

in rows three feet apart and manure well with superphosphate and potash; cultivate well so as to keep the ground moist.

Beans (Lima).—This valuable bean may be sown in large quantities during this month. They are well worth a trial.

Beet (Red).—A few rows can be sown to keep up a supply for the table.

Cabbage.—Plant out any healthy young plants, and those already up give a top dressing.

Carrot.—Plant out a few rows to keep up a supply, those already up will require thinning out and weeding.

Celery.—Plant out all forward plants in trenches so that they can be hilled up when they begin to grow; a little more seed can be sown.

Cucumbers.—May be planted in all parts. The hills should be dug deeply and well manured.

Egg Plants.—Plant out all young plants, and a little more seed may be sown.

Lettuce.—Young plants should be planted out and a little seed sown for future use.

Melons.—Look out for cut-worms on those plants already up. All kinds of melons may be sown largely this month.

Okras.—A few seeds may be sown.

Onions.—Any plants left in the seed bed may be planted out and a little seed planted for garden purpose; keep free from weeds.

Parsnips.—A few rows may be sown to keep up a supply.

Potatoes.—If not already sown should be planted in moist localities at once; it is too late for the drier districts. Care should be taken that the seed is free from scab. If there is any doubt soak them for an hour in a solution of Burgundy or Bordeaux mixture, half strength. All growing crops should also be sprayed with the same preparation to which Paris green should be added for the purpose of killing grubs, cutworms, etc.

Pumpkins and Squashes should be largely sown during this month.

Sweet Potatoes.—If not already planted, put out in seed beds as described last month. Those that were planted early will soon be sending out shoots, that should be planted out into the field as early as possible.

Tomatoes.—Those who put out early plants in sheltered beds or under glass should now have forward plants, while many who go in for intense culture will no doubt have forward plants growing in the open. Fertilise the ground and spray plants with Bordeaux or Burgundy mixture. A few of the more forward plants should have their laterals pinched off to induce the fruit to set early. One main and two branch stems only should be allowed to grow, by this means fruit can be obtained much sooner than if the plants are allowed to grow as they like.

Keep all weeds down and the ground well-cultivated.

FARM AND FLOWER GARDEN.

Farm work can comprise sowing of the following:—Amor Cane, Carob seed, Sugar Beet, Couch grass, Thousand-headed Kale, Lucerne, Maize, Mangels, Millet, Pie Melon, Pearl Millet, Pumpkins, Sunflower, Tobacco, African Box Thorn for hedges. Silage can be made.

In the flower garden sow such varieties of flower seeds as the florist advises, and of which there is a wide choice to lay down according to size of plots and ground available.

Spray fruit trees for aphids, caterpillars, etc., and protect trees against other possible pests. Seedlings of summer annuals can be planted out.

BULLETINS ISSUED BY THE DEPARTMENT OF AGRICULTURE.

Settler's Guide, 2nd, 3rd, 4th and 5th editions.

Handbook of Horticulture and Viticulture (A. Despeissis). 2s. 6d. and 1s.

New Dairying ("Agricola").

Production of Lucerne.

Diseases of Honey Bees (John Sutton).

What can be done by the Beginner on the Soil (Hon. James Mitchell, Minister for Agriculture).

Stack Silos (A. Despeissis).

Report of Proceedings of Conference of Producers.

The Diseases of Animals and Meat Inspection (J. Burton Cleland, M.D., Ch. M., Syd.).

Factory Dairying (J. A. Kinsella).

Vegetable Growing (G. Chitty Baker).

Examination of the W.A. Poison Plants (E. A. Mann).

Care and Treatment of Milk and Cream (J. A. Kinsella).

Hints to Stock-breeders (Weir).

Meat Inspection and Diseases of Animals (J. B. Cleland, M.D.).

Poultry, Care and Management of (F. H. Robertson).

Potato Culture (T. J. Wallas).

Back volumes *Journal of Agriculture*.

Tobacco Cultivation (H. Allerton Cowper).

Cotton-growing (H. Allerton Cowper).

Free copies of such publications as have no prices attached can be obtained on application.

EDITORIAL REQUEST.

Correspondence and Queries are invited from subscribers and readers of the Journal on any subject of interest to agriculturists and other settlers on the land, either conveying useful information or seeking it. Suitable letters and contributions will be published and answers to queries given in the succeeding issue, if communications are received by the Editor not later than the fifteenth of each month.

Secretaries of Agricultural Associations, Societies, and Farmers' Clubs are kindly requested to supply corrections of the lists published in the Journal, such as changes of appointments, dates of shows and meetings, as well as any other items of interest.

Rainfall for the month of August, 1908, recorded at telegraphic stations in Western Australia, and averages.

STATIONS.	Total for August, 1908, in points, 100 points=in.	No. of wet days.	Average for August.	STATIONS.	Total for August, 1908, in points, 100 points=in.	No. of wet days.	Average for August.
TROPICS :				NORTH COOLGARDIE			
Wyndham ...	Nil	...	Nil	FIELDS :			
Turkey Creek ...	Nil	...	9	Sandstone ...	175	8	...
Hall's Creek ...	Nil	...	1	Wiluna ...	33	4	51
Fitzroy Crossing...	Nil	...	Nil	Mt. Sir Samuel ...	79	5	69
Derby ...	Nil	...	14	Lawlers ...	107	6	60
Broome ...	Nil	...	6	Mt. Leonora ...	66	4	78
La Grange Bay ...	Nil	...	7	Mt. Malcolm ...	82	7	64
Wallal ...	Nil	...	13	Mt. Morgans ...	50	8	52
Condon ...	Nil	...	25	Laverton ...	69	6	56
Bamboo Creek ...	Nil	...	44	Murrin Murrin ...	65	5	62
Marble Bar ...	Nil	...	31	Yundamindera ...	68	5	93
Warrawoona ...	Nil	...	60	Kookynie ...	102	8	119
Nullagine ...	Nil	...	61	Niagara ...	112	8	81
Port Hedland ...	Nil	...	60	Menzies ...	88	5	81
Whim Creek ...	Nil	...	60	Mulline ...	69	8	152
Roebourne ...	Nil	...	25				
Cossack ...	Nil	...	47	COOLGARDIE GOLD-			
Fortescue ...	Nil	...	31	FIELDS :			
Onslow ...	5	1	51	Davyhurst ...	97	9	128
Winning Pool ...	5	1	71	Goongarrie ...	97	8	79
WEST COASTAL :				Broad Arrow ...	48	9	102
Carnarvon ...	38	2	65	Kurnalpi ...	114	8	102
Sharks Bay ...	40	3	87	Kanowna ...	73	8	115
Wooramel ...	44	2	85	Bulong ...	79	8	114
Hamelin Pool ...	67	5	81	Kalgoorlie ...	65	8	106
Northampton ...	155	6	373	Coolgardie ...	87	9	98
Mullewa ...	104	8	163	Burbanks ...	102	7	126
Geraldton ...	137	8	298	Widgemooltha ...	66	9	127
Greenough ...	192	7	315	Norseman ...	71	9	126
Dongarra ...	235	7	304	Boorabbin ...	5	2	120
Minginew ...	106	6	266	Southern Cross ...	59	6	102
Carnamah ...	90	4	212				
Dandarragan ...	253	6	334	S.W. COASTAL :			
Moora ...	149	5	246	Gingin ...	401	9	511
Walebing ...	179	6	298	Guildford ...	313	12	567
New Norcia ...	136	10	346	Perth Gardens ...	402	18	562
MURCHISON FIELDS :				„ Observatory	441	16	578
Peak Hill ...	28	5	89	Fremantle Signal			
Abbotts ...	28	4	76	Station ...	341	16	485
Gabanintha ...	42	4	91	Fremantle Oval ...	313	13	...
Nannine ...	56	6	54	Rottnest ...	307	15	460
Cue ...	100	6	81	Rockingham ...	489	15	522
Day Dawn ...	88	4	75	Jarrahdale ...	435	11	751
Lake Austin ...	249	5	104	Mandurah ...	516	19	561
Lennonville ...	243	8	94	Pinjarrah ...	339	14	648
Mt. Magnet ...	198	7	78	Collie ...	434	14	438
Yalgoo ...	113	7	89	Bunbury ...	436	16	548
Murgoo ...	156	4	76	Donnybrook ...	605	16	455

RAINFALL—continued.

STATIONS.	Total for August, 1906, in points, 100 points=in.	No. of wet days.	Average for August.	STATIONS.	Total for August, 1906, in points, 100 points=in.	No. of wet days.	Average for August.
S.W. COASTAL—continued.				S.W. INLAND—continued.			
Busselton...	620	20	432	Wagin...	94	9	242
Cape Naturaliste...	361	21	...	Katanning...	164	11	230
Karridale...	708	20	649	Broomehill...	180	11	245
Cape Leeuwin...	591	21	486	Kojonup...	179	13	324
				Greenbushes...	509	15	525
S.W. INLAND:				Bridgetown...	506	17	475
Kellerberrin...	63	4	154				
Meckering...	134	4	199	SOUTH COASTAL:			
Newcastle...	182	8	369	Mt. Barker...	358	17	351
Northam...	119	10	266	Albany...	359	17	317
York...	97	8	300	Breaksea...	434	20	400
Beverley...	58	6	240	Bremer Bay...	Incomplete.		285
Brookton...	56	6	...	Hopetoun...	325	9	181
Wandering...	180	12	363	Ravensthorpe...	149	10	126
Pingelly...	100	12	246	Esperance...	366	10	386
Narrogin...	140	11	286	Israelite Bay...	232	15	166
Marradong...	194	14	451	Balladonia...	65	8	91
Williams...	141	9	356	Eyre...	241	10	120
Arthur...	153	7	288				

REMARKS ON THE RAINFALL FOR AUGUST, 1908.

The rainfall is above the average over the greater portion of the Murchison, the North Coolgardie Goldfields, and extreme South-West and South coastal districts. Over the rest of the State it is below, being specially marked throughout the South-West. In the Tropics no rain has fallen.

E. B. CURLEWIS,
Divisional Officer for W.A.

[REGISTERED AT THE GENERAL POST OFFICE FOR TRANSMISSION BY POST AS A NEWSPAPER.]



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OF

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PUBLISHED MONTHLY.

Vol. XVII.—Part 4.

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OCTOBER, 1908.
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PERTH

BY AUTHORITY: FRED. WM SIMPSON GOVERNMENT PRINTER

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1908

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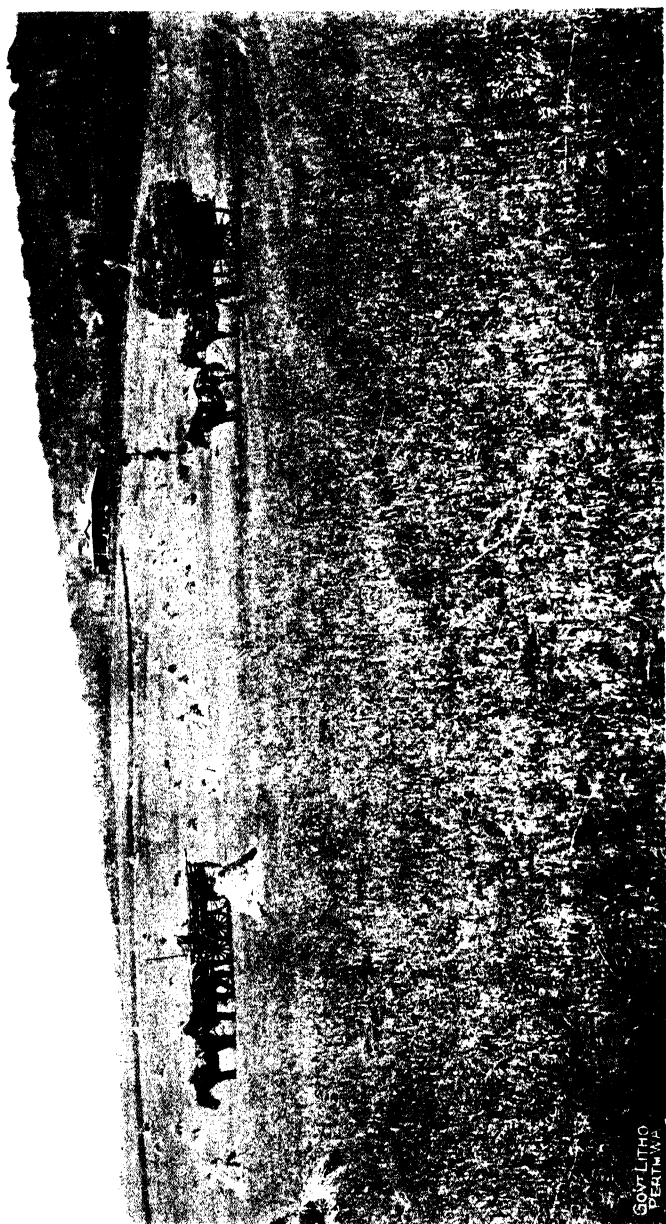
We have just landed a large stock of **NEW SEASON'S SEED**,
from the most reliable sources, of

**Paspalum Dilatatum, Cocksfoot, Rye Grass,
Prairie Grass, Rhodes Grass, White Clover,
Red Clover, Sheep's Burnet, Rape, etc.**

**BEFORE ORDERING SEND FOR OUR ILLUSTRATED GRASS SEED CATALOGUE AND HINTS
ON THE CULTIVATION OF GRASSES.**

GARDNER BROS.,

609 Wellington Street, Perth.



Wedgehorn Park, Bonswick (Mrs. Edwin Rose).

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PER 111111

JOURNAL

OF THE

Department of Agriculture

OF

WESTERN AUSTRALIA.

Vol. XVII.

OCTOBER, 1908.

Part 4.

NOTES.

The Bounties Act.—It is estimated that claims for bonuses under the Commonwealth Bounties Act for the period ending 1st October, 1910, on Queensland industries, will be as follows:—Cotton and cotton seed, £720; sisal hemp, £100; coffee, £600; tobacco leaf, £1,500; and tinned fish, £2,000.

New style of hobbles.—An American idea for hobbles is to fasten a surcingle about the horse's body, having two short straps on the under side to buckle loosely around the forelegs and drop about half way to the animal's knees. This does not interfere with walking or feeding but the animal cannot run, and is therefore easily caught. As it also prevents jumping, it is a good thing to apply to unruly cattle.

Compulsory grading of butter.—Messrs. W. Weddell & Co., in their review of the colonial butter market in London, declare that "unless grading be made compulsory it loses the greater part of its efficacy in improving the general quality of butter, and is of little real benefit to the State. If it be optional, its effects are delusive, as only those factories which already make the best butter avail themselves of the advantages of obtaining a Government certificate as to the excellence of their product. The great and indisputable claim for the system of Government grading lies in the fact that, if it be compulsory, it raises the quality of all the butter in the State."

Preservation of Western Australian Flora and Fauna.—The Natural History Society of Western Australia has made a request to the State Government to declare Barrow Island a reserve for all time for the absolute preservation of our natural fauna and flora, many of which are unique and existing nowhere else in the world. Of these, the Society mentions the species of *Kangaroo* (*Macropus isabellinus*) found on Barrow Island, a bandicoot

(*Perameles barrowensis*), a rat (*Mus ferculinus*), and a wren (*Malurus edouardi*), which should be preserved from extinction at all hazards.

Certificates of Soundness.—A commendable innovation was adopted by the Northam Agricultural Society at the recent show held at Northam in issuing certificates of soundness for stallions examined and passed at the parade. This is the first occasion in this State in which the plan was introduced. The certificates have the signatures of Mr. R. E. Weir, Veterinary Surgeon of the Department of Agriculture, and two judges. The possession of such certificate by owners of stallions used for stud purposes will be a guarantee to breeders of the animals' soundness and freedom from hereditary defects.

Competitive Prize Gardens.—The Wagin Agricultural Society has adopted a scheme of giving prizes for the best-kept flower and kitchen garden in its district, the object being to encourage the cultivation and beautifying of residential blocks. There were four competitors this year, the successful one being Mrs. French, whose garden at one of the railway cottages is described as a veritable picture, and the gold medal was awarded to her by the judges. The example of the Wagin Society could be followed by others, as stimulative to the educative influences as well as profit of such a desirable home industry.

Bone Manure.—Bones are preferable to other more active phosphate manures in cases where a gentle but continuous supply of phosphoric acid and ammonia is required. The effect of bones extends over several years, and is regulated by the state of division or size of the fragments of bones supplied. From the slow action of bones they are well adapted for application to permanent pasture. Their chief value as a manure is greatly dependent on the large quantity of phosphoric acid in the shape of phosphate of lime which they may contain. This, upon decay, yields its nitrogen in an available form which greatly assists the action of the phosphate of lime.

Phosphatic Deposits in Midland Districts.—Mr. Goetzl, the Geologist of the Department of Agriculture, who is making researches in the Midland districts, has made a further report in connection with his discovery of rich deposits of phosphates at Nanban Creek, to the west of Moora, and about four or five miles from the sea-coast. He describes the deposits as of good grade for agricultural requirements and states that there are already between 6,000 and 8,000 tons available for farmers. Two men are employed in sinking shafts to reach the deposits. Mr. Goetzl also announces that he has come across a number of great caves, which were the camping ground of pre-historic animals.

Straw Butter-Boxes.—The *Sydney Mail* says that "in dairying circles some discussion has been caused by news from London to the effect that Queensland butter is likely to be shipped in future in boxes made of prepared straw. For many years patent processes for using pressed pulp instead of timber in making butter-boxes have been under consideration in Melbourne, and it is probable that one of these patents is now being financially sup-

ported, and that the expectations of the promoters are at the foundation of the current report. In view of the increasing scarcity of suitable timber for boxes, and the several failures to produce a pulp substitute, invention is now seeking to meet the situation by working on different lines, and it is expected that in the coming season an entirely new kind of box will be practically tested. Reliable authorities entertain good hopes of this new method of making boxes, which will shortly be made public."

New Bordeaux Mixture.—At the Woburn (England) Experiment Fruit Farm investigations have shown that the clear lime water made by slaking 3lb. of quicklime in about 100 gallons of water, and then adding 86 gallons of this clear solution to 14 gallons of water in which 6lb. 6½oz. of *copper sulphate* have been dissolved, will yield 100 gallons of Bordeaux mixture superior to and cheaper than that made according to the commonly accepted formula. As our ordinary commercial forms of quicklime vary exceedingly in its essential constituent, viz., *calcium oxide*, the *potassium ferro cyanide* test becomes essential if anyone is disposed to give this formula a trial. The scientific reasons for its acceptance seem truly convincing, and quite apart from the question of economy its trial can be recommended to orchardists.

Cacao Planting.—We are in receipt of a neat illustrated booklet entitled "The Future of Cacao Planting," by Mr. Harold H. Smith, with an introduction by Sir Daniel Morris, K.C.M.G., etc, Director of the Imperial Department of Agriculture in Barbados, W.I. The book, which is very instructive in the methods of cultivating this useful plant, deals with the cacao-planting industry in all its branches, and includes many valuable suggestions that have not hitherto been generally discussed, much less passed into general practice. These include the use of vacuum chambers for drying the beans, the principle of planting belts of rubber and other economic plants round the cacao to distribute the financial risks, and in case of disease to restrict the affected areas. Other points raised are the grafting of the trees, improved pruning methods, green manuring, etc.

Local Manufactures.—Messrs. Richard Purser & Co., of King Street, Perth, are manufacturing locally a number of implements suitable for use on farms, stations, etc. Among others are the "Purser" tubular steel frame and fertilizer drill, the only one manufactured in the State. The "Purser" T-bar pulverising roller and packer, which prevents evaporation, leaves a finely pulverised ribbed surface and absorbs all moisture. It is claimed that farmers using these rollers are independent of dry seasons, as the full amount of rainfall is conserved. The "Purser" patent farm gate, made on a new principle, is as light on the hanging and as cheap as a wire gate, with the substantial appearance and strength of a bar-gate. Space will not permit enumeration of all Messrs. Purser & Co.'s manufactures, but the firm invite farmers and others to send for catalogues and price lists.

Eradication of Mosquitos.—Barbados is the only West Indian island that is absolutely free from malaria and from the presence of the *anopheles* mos-

quito. The reason of this immunity is ascribed to the fact that all the pools and swamps in the island are stocked with swarms of the tiny fish (locally known from their vast numbers as "millions"), and that their favourite food is the larvæ of the mosquito. The fish is classically identified as *Girardinus pocciloides*. The "millions" have been imported to malarial districts in other islands with great results. In Jamaica they have caused a marked diminution of fever by destroying mosquito larvæ. They have been supplied to Colon and British Guiana, countries with a bad reputation for severe malarial fevers. It is proposed to introduce the fish to mosquito infested parts of Africa. Our own acclimatisation societies in Australia could take a leaf out of the same book and endeavour to import these wonderful "millions" for the subjugation of mosquito-infested areas.

Educational Influence of Agricultural Shows.—A writer in the *Australasian* asks the question:—"Can anything be done to stimulate the interest and increase the educating influence of Agricultural shows? This may be answered in the affirmative, and the Royal Agricultural Society (Melbourne)," he continues, "at the late show demonstrated one of the ways in which it may be done—by offering prizes to schools. Those who neglected to go to the late show would, had they visited it, have seen something that was not 'the same old thing.' The exhibits of the schools were very interesting, indeed, so much so, that on the first day of the show the public could not get a sight of them, as the judges occupied the whole day inspecting them and the three district exhibits under the same roof. The Sale High School, which obtained first prize, had on its wheat the date of sowing and harvesting. This in itself may appear a little thing; but, if it were a rule that the dates of sowing and harvesting should be attached to all exhibits, some very useful knowledge would thereby be disseminated. When looking at the 'champion' wheat, oats, etc., one looks in vain for the information when it was sown and reaped, or how much it weighs per bushel."

Western Australian Grapes in London.—The Agent-General of New South Wales has written to the Department of Agriculture of that State regarding the excellent prices obtained for a shipment of grapes from Western Australia. The flavour of these grapes was pronounced by experts to be equal to that of the best English hot-house varieties. The variety that carried best was the Black Malaga. The white grapes, however, did not stand the journey so well, because they were packed when they were too forward. The temperature in the cool chamber of the vessel, about 40deg. Fahr., had been judged to a nicety, but the bunches were nearly all packed in cork-dust, and the trouble was that when they were lifted out the cork-dust adhered to the fruit and could be removed only with difficulty. Mr. B. Emanuel, of Covent Garden, who bought the whole consignment, says:—"If each bunch had been wrapped in paper as the Cape grapes are, they would have landed in perfect condition. The Australian fruit is much superior to and of a better class than the Cape variety, and if the packing is well looked after at the other end there is a big future for Australian grapes in this country." The grapes commanded a ready sale, and made from 8s. to 14s. a case, averaging from 12lb. to 18lb.

The Dairy Cow.—There is a distinct personality about the dairy cow possessed by no other animal. She is a class by herself. She is both a luxury and a necessity because of her product. She possesses an article of diet that is indispensable and for which there is no substitute. Of all the animal kingdom there is none so distinguished. She is pre-eminent, and her example is worthy of imitation. She is free from ostentation. She is modest and retiring in her demeanour, but philanthropic in her nature. She is not spasmodic, but quietly works all the time, and the result of her labour is realised at once. She occupies the proud position of mother of her own family and foster-mother of a large proportion of the human family. She is not only a home builder, but a household provider and an educator. She is not only a civiliser, but the advance guard of prosperity always. There is no farm on which she has been allowed to take an active and conspicuous part but what has been made more fertile, more productive, more remunerative, and more valuable. There is no country in which she is a prominent factor in the agricultural interests but what is made more prosperous by her. The home of the dairy cow is a land of peace and plenty, where intelligence and refinement abound.

French Gardening.—Very great interest has been created throughout England in the system of intense cultivation known as French gardening. The *Daily Mail* states that not only people of all sorts and conditions, including large landowners, leading seedsmen, and every variety of person who owns a garden, have written inquiring about intense cultivation, but a considerable proportion have started French gardens and engaged French gardeners. Over two hundred reformatory schools have already adopted the system, county councils are providing frames and bell-glasses for instruction, and companies have been formed to provide requisites. Persons have taken land to reside in the country in order to promote intense cultivation to supply English wants from English soil. In a book published by Mr. McKay exact figures are quoted of a $4\frac{1}{2}$ acres farm at Evesham. From one acre gross returns of over £600 were procured. "From 600 lights 21,600 lettuces were cut at an average of 2s. per dozen. Out of the same lights 2,400 cauliflowers at an average of 4s. per dozen; again, from the same lights 2,400 turnips and 5,000 dozen bunches of carrots at 6d. per dozen, as well as three melons from each light occupied with them at 2s. 6d. each." We hope to be able to give further information on this interesting subject in a future issue of the *Journal*.

AGRICULTURAL CONFERENCE: PAPERS READ.**WHEAT-BREEDING : NOTES ON CROSSBREEDING, ETC.**

G. F. BERTHOUD, State Farm, Hamel.

Wheat, indigenous to Asia, is one of the most useful plants for mankind. Its culture and gradual improvement by man dates far back into remote ages. It has now attained a very high state of perfection and is grown in all temperate parts of the globe. The family is divided into several distinct groups, nearly all of these containing numerous varieties. There are also some rare, and as yet little known kinds in Persia, and other distant parts of Asia, differing widely in general appearance and grain characteristics from those commonly cultivated here. I shall mention a few only of the leading members in this interesting family.

The preferred, most widely known, and generally grown in Australia, are the bald wheats, which are all related or derived from *Triticum vulgare*. Taken as a whole, this class contains our best and most popular milling varieties, being prolific, and easy to thresh and clean. They are the Australian farmers' favourites and likely to stay in the front ranks.

For warm places, the following are good reliable croppers:—"Alpha," "Cross-bred 73," "Farrer's Firbank," "Comeback," and "Federation." For cooler districts, "Plover," "Marshall's No. 3," "Field Marshall," "White Lammas."

A new wheat, "X53d," selected from a cross made by the late Mr. W. Farrer, has been successfully grown at Hamel for several years. It is a very promising kind for hay and milling purposes.

Australian-raised varieties are now plentiful, good, and in every way fitted for growing over a wide climatic range. The progressive agriculturist will have no difficulty in buying seed of the right sort for his farm, providing he shall use foresight in selecting a kind known to do well in a locality nearly conforming to that of his own place. However, when in doubt on starting in a new district, a good plan will be to sow a few small trial plots with seeds of sorts thought to be the best. Next season the main crop may be safely sown with seed of that kind which gave the most profitable returns. These useful tests are cheap, easily done, and always furnish reliable data to work on.

Triticum durum.—Wheats of this class are those most extensively grown in Algeria, India, Turkey, and other hot climates. Their straw is tall, firmer, and more solid than that of the ordinary bald kinds. The plants also stool less, that is make fewer stalks, hence better for maturing quickly in dry places. Heads of fair size, usually furnished with heavy brown or dark beards; grain large, amber colour, and flinty. Flour strong, rich in gluten, and the best for making paste foods, such as macaroni. To attain their full maturity they require a hot climate. In the dry districts of Australia they are found to be very useful for hay-making. The beard is, however, a slight drawback. "Belatourka," "Atlanti," and "Medeah" are good. "Huguenot" is a well-

fixed, beardless variety of the "Medeah" type, made by Mr. J. Correll, of Arthur River.

Triticum turgidum (Poulard wheat).—These, although near to the *durums*, are very distinct. Habit tall, straw stout, yellowish white, and almost solid in the upper portion; heads heavy and thick set; chaff and beards white, occasionally tinted with black. Many of the beards are shed at maturity. Grain soft, large, swelled in the centre, very prolific; flour of inferior quality. Plant prefers cool climate and fairly moist soil, free from rust and smut. Useful for hay and feeding grain to poultry. Good results obtained at Hamel. They are all late. "Gallands" and "Centennial" are the best.

Triticum spelta (Robed wheat).—These differ from all others by their grain being very adherent to the chaff, within which it will remain embedded after threshing, and it has to be peeled or cleaned off by a special machine. Grain medium size, in appearance horny or pinched, but yields an exceptionally fine, pure white flour, which is preferred above all others for high-class pastry work. Plant slow in growth, hardy and suitable for growing on poor land, in cold climates. One variety, "Dinkel," has given good results at Hamel, and may be useful for hay.

Wheat improvement may be done in two ways, the first and most generally followed is by simple selection, objective in view being the gradual advance of a chosen kind. When a farmer has a variety well adapted to meet his requirements and desires to keep the strain pure and true to type he will find no great difficulty in doing so. During the growing season he shall carefully select and mark before maturity those plants which show the most vitality and come nearest to his ideal of perfection. Harvest these separately, rejecting all small heads, also the small grains from tip and base of all the selected ears. Next season sow this pure seed on a breeding plot to furnish seed for the following year's field sowing. Meanwhile keep on marking the best plants in the select seed plot. If one has the time and patience to follow this up for a few years the bulk of the seed will have improved greatly instead of deteriorating. This simple process is always interesting; just the right kind of work to occupy the minds and attention of our boys, helping to make them love a country life and to become successful Australian agriculturists. However, this fact should be borne in mind, that all varieties improved by selection alone are liable, should the fostering care given be relaxed or neglected, to revert back to the old stock.

The best and most lasting method of fixing our advanced strain will be by cross-fertilising our favourite with another but equally pure strain, also having many of the good points which we desire to retain. By doing this we make a new wheat which should have all the good qualities of both parents and will be likely to retain them for many years. Plant breeding is successfully carried out on similar lines to those followed by pedigree stock-breeders. Always use the pollen from the best possible plant obtainable, which will impress its leading characteristics on the progeny. In the past 18 years I have devoted considerable time and attention to practical wheat improvement, and have derived much pleasure in the work. To my esteemed friend, the late lamented William Farrer, most renowned of wheat-breeders, I am indebted for much useful advice and kindly help, freely given. My first experiments were done on a very small scale in the Northern portion of Victoria, then for several years in Riverina, New South Wales, and for about eleven years, combined with other work, on the State experimental station at Hamel, in this State,

where, although a wet and not one of the best localities for wheat, on the whole fair results were obtained. Two of the early cross-breds, "Alpha" and "X73" are well known and esteemed in the wheat districts.

Many of Farrer's early sorts are excellent for culture in the eastern wheat districts. The work of cross-breeding is in itself a very engrossing study to be highly commended to those who are inclined for scientific investigation, and who have the means to wait for results. I do not advise farmers generally to undertake it, because results are always slow, often disappointing to the worker, and from a monetary point of view not likely to pay. Cross-breds are not properly fixed or become stable separate varieties until after the lapse of six years at least from date of impregnation, even after that a few plants may throw back, especially if the kind be shifted to another locality. Frequently in cases when the parents were of dissimilar character, for instance, a bald mated with a bearded variety, objective being to eliminate the beard, some idea may be formed of the patient care and work required in selecting the most likely bald plants, cultivating each one on separate breeding plots for a period of several years. The opinion sometimes expressed that quick or wonderful results may be attained by cross-breeding is a fallacy, for although one may make a large number of crosses only a small percentage of the seedlings will produce plants, showing any very decided advance on their parents or likely to become permanent acquisitions. Then the milling qualities, such as the colour and strength of the flour, cannot be truly known until tested by the miller. The operator to be successful must have an inborn love for this class of work. Having formed in his mind an outline of the ideal which he desires to attain, then all that he needs will be a pair of sharp eyes, light deft fingers, and plenty of patience. Success is fairly certain to follow, providing that the work is done along sensible and well-defined natural lines.

It is a waste of time trying to mate wheat and rye, or barley and wheat, etc.; crossing kinds differing greatly in the family relationship would, if successful, produce true hybrids or mules, curious certainly but of doubtful value. For instance, an ordinary variety such as "White Lammas," if mated with a *durum*, the impregnated grains will be thin, weak, and shrivelled, and nearly all will fail to germinate. Varieties so remote from each other do not combine to produce a fertile or vigorous progeny. The best results are obtained by judicious inter-breeding within each family group. By keeping in view a definite objective, amelioration, such as the union of an extra early weak straw variety with a later and more vigorous strong flour sort, ideal sought—early maturity combined with superior milling quality. Many of Farrer's Australian wheats show very decided progress on these sound lines.

There is a curious feature often noticed in the early life of a cross-bred which usually appears in the second generation or planting. Some of the plants will have a very peculiar grass-like habit, forming dwarf tufts of stiff, narrow, dark green foliage. With me these plants always died off without yielding any seed. Variation is always most pronounced in the second generation when the closest possible attention should be given to selecting suitable plants. The best time for crossing is about noon on a fine warm day, a week or so after heading or when a few of the first anthers show white on outside of the chosen ears. Open the glumes of the centre spikelets—intended for impregnation—with very fine forceps, remove the anthers or male organs without injuring the stigma or female organ. In a short time this will become slightly sticky or ready for application of the pollen or dust from the chosen

male. Put on plenty of this to cover the stigma in a number of the spikelets, then wrap and tie up the treated ear with fine light muslin to keep the glumes closed and secure from outside influences. To obtain a sure supply of pollen to be ready when wanted, on different dates sow several rows of the desired kind in order to prolong the duration of the flowering period as long as possible. Never use bluestone solution on the first generation of seed. It would kill the germ which is naturally weak. Plant each seed about nine inches apart along the row, cover one inch in depth, allowing a space two feet wide between the drills to allow of easy inspection during growing period. On one side have a row of the male and on the other the female or mother variety. This will facilitate selection and comparison. Keep date of cross and object of each in a field book for future reference.

So far breeders in Australia have given very little attention towards improving the oat plant and making varieties more suitable to our climatic conditions. There is a wide field open for an earnest worker who shall endeavour to fill this want by producing a variety combining sweet straw with good feeding grain. Natural crosses or hybrids are very rare in cereals owing to the plant being self-fertilised by its anthers just before they appear on the outside of ear. This is the reason why the operator must open the glumes and remove them from the mother plant which he desires to breed from, or his work will be useless. Maize is quite different; it is fertilised from the outside and varieties are very easily mixed.

In conclusion, I am very pleased to state that I have lately introduced from France some seed of H. de Vilmorin's cross-bred wheats. These new varieties tried in England this year have given some marvellous results by out-yielding all others. The grain looks well, said to be fairly early and rich in gluten. I trust that they may prove to be equally valuable for us.

THE MILLING PROPERTIES OF WHEAT.

By E. A. MANN, Government Analyst and Agricultural Chemist.

The farmer wants a wheat which gives a good yield, which stands well, will not shell, and is resistant to disease.

The miller wants a wheat which will produce a good yield of flour to suit the baker, and he in his turn is guided by public demand.

The ultimate aim, therefore, of the farmer must be to produce a good bread wheat, and as we come more and more into the world's competition this question will demand increased study.

This subject has received very little attention so far in this State while other countries are becoming fully alive to its importance. In Canada, America, Europe, and the Eastern States the improvement of wheat is a matter of continual investigation and experiment.

The principal points demanded by the baker in a good bread flour are colour and strength. The demand at present is for a white loaf and this must be met, but, consistent with good colour, as high a strength as possible must be obtained.

By strength is meant the quality which causes the flour to produce a shapely, light, nutritious loaf, and this carries with it the property of making more loaves per bag in proportion to the increase of strength.

The cause of this strength is not fully understood. This is the question which is chiefly employing the energies and experimental powers of experts all over the world to-day.

At first it was thought that the strength depended on the proportion of gluten in the flour, but it was found that flours containing a high amount of gluten might still be very weak, while others were much stronger than would be supposed from their gluten content, and it was noticed that the gluten extracted from different flours varied greatly in character, some being tough and elastic, others soft and sticky.

The composition of the gluten was therefore investigated and it was thought that the solution of the problem was to be found in the proportion of gliadin which the gluten contained, but recent researches seem to throw doubt on this again.

While the causes of variation, however, still remain obscure, the variations themselves are clear and definite enough and there is ample scope for progressive work in the endeavour to combine in one wheat the maximum of desirable qualities.

It is not my object to deal with wheat selection as a whole, as I understand that is being dealt with by Mr. Berthoud, but to point out that besides the visible qualities of a wheat which can be discerned by any careful observer (such as prolificacy, resistance to disease, colour and plumpness of grain, etc.) there are other characteristics which it is important for a grower to consider, but which he cannot so readily discern. These are summed up in the phrase the "Milling Properties of the Wheat."

To determine these the farmer or wheat breeder needs assistance and this is now generally afforded by the use of small experimental mills, in which a mere handful of wheat can be subjected to an actual milling test. Such a mill was installed in the Government Laboratory last year, and an account of some of the work done was published in the *Journal of Agriculture* for last April.

In this machine $\frac{3}{4}$ lb. of wheat can be completely milled and the yield of flour, bran, and pollard obtained. The flour can then be analysed and tested as to its strength or subjected to actual baking trials. In this way it is comparatively easy to ascertain the relative value of a number of samples of wheat.

There are several important ends which this method of investigation may be made to serve.

1. The breeder of new wheats in his endeavour to select the best for his purpose can subject every new crossbred he produces to this test, and so select from his collection the best type. This saves years of work and endless labour in the task of wheat selection.

2. Wheats vary in their properties according to the soil and climate in which they are grown. For instance, I have recently received from the Chief Agricultural Chemist in Canada a letter in which he says, "Your inquiry regarding the development of hard wheat on Canadian soil covers a great deal of territory, but if you refer more particularly to what is known as the Canadian North-West, I think it may be safely stated that the tendency of soft wheat grown there is to become hard, or more correctly stated, a tendency to the increase of the protein content of starchy wheats may be observed."

Perhaps the reverse is also true. It seems a comparatively easy thing to improve our wheat here by growing the strong Manitoba varieties or introducing the Fife strain among our grains. It has been asserted, however, that in Western Australia wheats originally strong degenerate in gluten content and strength, and if so, it would be useless to depend simply upon such importations. But special attention must be devoted to breeding new wheats suitable for our special conditions.

This statement is not proved, however, and one of the important duties awaiting us is to test such a wheat grown here under similar conditions year after year and observe what changes, if any, take place. In this the co-operation of farmers would be of immense value to the Department.

3. Though there cannot, as yet, be said to be any particular wheats which are characteristic of this State or grown so widely that they can be distinguished as specially associated with Western Australia, our flours do seem to be to some extent peculiar. Generally speaking they are low in gluten compared with those in the Eastern States, but nevertheless they are higher in strength than would be expected. Whether this is due to repeated use of seed from old strains, or to conditions of soil and climate producing a special character of gluten, can only be determined by carefully planned series of experimental plots controlled by tests with the experimental mill. Ten years could well be spent on this inquiry.

4. Improved systems of manuring can be arrived at by the same method.

To show the importance of this question to farmers I would like to quote the following figures from the market reports:—

In New South Wales (where the Manitoba wheats are being grown to a considerable extent) this class of wheat commands 3d. to 5d. per bushel more than its competitors. The price of Manitoba flour in Perth to-day is £15 a ton while local flour sells at £9 12s. 6d.

But there are other facts to which I would like to draw your attention. We must grow the best possible bread wheats if our flours are to compete in the world markets. This competition should be our aim. I feel sure it is the desire and belief of many here that this State may yet become an enormous producer of wheat, but it is not so generally recognised that if we are to derive the fullest benefit from our wheat growing we must export not wheat but flour. To export wheat in the grain is wasteful and extravagant.

Only 65–70 per cent. of the wheat goes to form flour, the remaining 30 per cent. forms the offal (bran, pollard, "shorts," "middlings," etc.).

This offal contains a large proportion of the fertilising constituents which our crops have taken from the soil and these should not be shipped out of the country. We import all manner of fertilisers at a great cost, yet in every million bushels of wheat we export we send away £18,000 worth of these plant foods, including £5,000 worth of the phosphoric acid which our soils specially need.

We desire to build up a dairying industry, yet every million bushels of wheat takes away 8,000 tons of the best dairy feedstuffs, of which we last year imported 11,000 tons.

In the 12 months ending the 30th June last there were exported from W.A. 520,000 bushels of wheat valued at £100,000. If this had been first milled it would have produced nearly 11,000 tons of flour valued at £104,000 and in addition there would have been kept in the country 5,000 tons of dairy feed, worth £29,000, including £9,000 worth of fertilising material. In the

latter is included phosphoric acid equivalent to about 600 tons of superphosphate or 1/15th of our importation of that fertiliser.

For the whole of Australia the loss in this way in 12 months I have estimated is about three-quarters of a million sterling.

If it is so much to the advantage of the country to mill its wheat it must be to the advantage of the farmer to grow only those wheats which are best for milling in the sense which I have endeavoured to explain.

One final word as to how this practical end may be attained.

- (1.) By the study of the literature of the various kinds of wheat and the work done on them.
- (2.) By growing samples of special seeds and furnishing samples to the Department for test. Samples of special varieties are distributed every year by the Department.
- (3.) By experimental plots on the State farms under carefully planned and controlled conditions—checked by milling tests.
- (4.) By the various shows making milling and other tests a prominent feature in the judging of wheats and flours.

The Royal Agricultural Society for the first time last year introduced the analysis of flours in their judging and this year test methods are to be still further availed of.

This system of awarding prizes has been followed in Sydney for some years.

It would be a further step forward if prizes were awarded in definite classes, *e.g.*, hard, medium, and soft wheats (named varieties) or strong and weak flours. This would still further encourage the cultivation and study of different types and arouse an intelligent interest in the subject. The Government could perhaps be asked to provide special prizes at the shows with this object in view.

INSPECTION OF STALLIONS.

R. E. WEIR, M.R.C.V.S.

This subject will appeal to those present as one which requires the earnest attention of all agriculturists and pastoralists throughout the State. Those of you who have been acquainted with the industry in the past must acknowledge that indiscriminate breeding has been the rule, and that we have now inherited a number of weedy and unsound horses which, from an economical point of view, are of little commercial value. It is therefore obvious if progression is to be our motto we must begin and lay the foundation of a system of horse-breeding which in future years can only have the best possible results. This can only be obtained by breeding from the very best type of pedigreed sires, which have on examination been found free from unsoundness, more particularly of an hereditary character. It is not unfrequently remarked that horse-breeding is not always a commercial success, which may be possible when the industry has been undertaken without any fixed rule and when possibly the conditions pertaining to development have been unfavour-

able. But when the work has been carried out on scientific-lines and all other conditions of a suitable nature, the very best results have been achieved. The enormous development which is taking place in the agricultural parts of the State ensures a continuous steady demand for drafts and the same applies to lighter horses, which are required in connection with the stocking of new grazing areas. We have thus an assured market at our doors for many years to come, and when over-production does occur a never-failing market, more particularly for light horses, is always obtainable in India. Having satisfied ourselves that the industry from a commercial point of view may be successfully pursued we have next to consider if the State in itself is suitable for the propagation of this class of animal. I have no hesitation in saying that with careful management development of the most desired character can be produced. This has been clearly demonstrated by the particularly good specimens of drafts and thoroughbreds which have been on exhibition at our local shows of recent years; some of those young animals would compare very favourably with those bred in any other part of the world. Having satisfied ourselves on those points, we have next to consider the best means to be adopted to obtain good results. The chief factor in connection with horse-breeding is the selection of good pedigreed sound sires, and this brings us to the consideration of the best means to be adopted to have an assurance of this factor. Only quite recently the Royal Agricultural Society had this matter under consideration, and it was proposed that a veterinary examination of all sires entering for competition at shows should be made. The matter was, however, left in abeyance, for the reason that serious objections were raised against the innovation. It may be advisable that the committee in their wisdom came to such a conclusion, as assuredly the best results could not possibly be obtained from shows alone. The reason is obvious as at the time of the year when shows are held the various sires are busy with their season, and only a limited number of those in the immediate vicinity to shows could possibly be present, and some difficulty might also be experienced with respect to a veterinary officer being able to attend some of the minor shows. Some other method will therefore have to be considered, and in my opinion this can be satisfactorily arranged by the Royal Agricultural Society holding an annual exhibition or parade during the off season for sires. At a gathering of this nature a double object would be secured, viz., the eliminating of all unsound sires by means of a veterinary examination, and a means provided for delegates from the various societies to select sires to travel their particular districts for the following season. Needless to state that if good prizes were offered for horses holding a veterinary certificate for soundness, the success of such an exhibition would be assured, and the advantage to be derived from an educational point of view would be considerable. The Government could also assist in this direction by giving a premium to a few specially selected horses to stand in the chief breeding centres of the State, one of the conditions being that a minimum charge should be made for approved mares.

What constitutes Unsoundness.

It must not be supposed that blemishes and injuries resulting from accidents, etc., are in any way injurious to breeding animals. We often find thoroughbreds which have broken down during their racing career being afterwards utilised for stud purposes and may be successful. Notwithstanding this, however, the better policy is to select sires which are in the best of health

and free from every form of blemish or unsoundness on the principle that breeding material should be of the best procurable character and quality. Bearing in mind the latter statement the following diseases are chiefly to be guarded against and may be considered hereditary:—Nervous affections, such as shivering and stringhalt, cataract of the eye, broken wind and roaring, diseases of the bones, such as spavin, ring bone, side bone, navicular disease, etc.; peculiarities of conformation have also to be considered, such as curby and boggy hocks, flat, weak, unsound hoofs, ill-formed knees, washy couplings and short upright pasterns. All of these bad points and qualities should, if possible, be avoided in the selection of a sire and choice made of one whose conformation is as nearly perfect as possible.

Among communicable diseases should be included mange, influenza, infectious abortion, and those associated with the genital organs. As a general principle it also is inadvisable and unwise to breed from sires that are temporarily sick from any ailment that impairs appetite, vigour, or constitution. The best results in breeding require perfect bodily and constitutional health, and sickness of all sorts should be properly treated and perfectly recovered before mating is permitted.

Selection of Sires.

The general principle of heredity is that "like produces like." There are departures from this rule, but it proves true in a majority of instances, and it should be remembered that bad points and qualities are as likely to be transmitted and reproduced as the reverse. No matter what type of horse is decided upon, the animal should have a strong, well-knit body, large sound joints, and good action. Tendons should be prominent with fine silky hair; the latter indicating that the bone is of a dense texture, hence of good lasting quality, and where this is the case the temperament of the animal is likely to be vigorous and the constitution hardy and healthy. When coarse, profuse hair is present, it is usually an indication of spongy bone and a tendency to disease, such as grease, etc. It is advisable therefore to select sires that have clean, wide, flat legs, which denote large conformation of bone and well-developed tendons. Sound hoofs should also be specially considered, as the wearing qualification depends largely upon the animal having strong, well-developed hoofs. In conclusion, sires should be selected that are of the right type for the production of the class of horse desired, and in addition to rejecting unsound and imperfect animals those of bad temper, intractable disposition, or other objectionable traits should likewise be avoided.

NOTES ON GRASSES.

By G. F. BERTHOUD.

I have pleasure in placing before you, for inspection, one typical plant of each of the grasses denoted hereunder, which may prove to be interesting to the agriculturists assembled in Conference.

"*Phalaris commutata*."—Valuable perennial grass, native of the countries bordering on the Mediterranean sea. The plant before you is one of a batch of 5,000, all raised from seed produced by one plant, and sown early in Sep-

tember of last year. The above plant if subdivided will make fully 100 sets, which shows how rapidly and easily this grass may be propagated. Old plants shoot up freely in the early autumn months, producing a large quantity of good feed, which is much relished by stock, and worthy of the close attention from all who may desire good winter and early summer feed.

"Festuca arundinacea."—This is a very strong growing perennial grass, useful for cultivation on moist lowland, where it will quickly form thick tussocks, producing a large supply of feed for cattle and horses. Seed sown early in September, 1907.

"Rhodes Grass (Chloris guyana)."—This is now fairly well known in this State. Under favourable conditions, where the soil retains dampness during the summer months, it will make wonderful growth; its creeping stems quickly covering the soil with a dense covering of foliage. The plant seeds freely, and may be increased quickly by cutting off the rooted runners, planting three feet apart each way. The plant shown is from a cutting planted last October.

"Trifolium subterraneum."—Seed introduced and sown on 3rd October of last year. The young plants came up very well, and made exceedingly rapid growth, forming a thick carpet of soft foliage and creeping stems. The seed pods are of peculiar shape, which force or screw themselves into the soil. They contain two or three black seeds. One of the most valuable clovers for damp land.

"Wallaby Grass" (Danthonia)."—These very nutritious perennial grasses are natives of Australia, over which they are very widely distributed. They are hardy, seed freely; plants form nice close bunches, which make excellent sheep feed. Seed sown in the autumn and early winter. Germinates fairly well. Seed of several kinds sown here in September last year.

Kangaroo Grass (Anthistira)."—A well-known hardy Australian grass. Seed sown here in October. The young plants grew well, producing flower stems four feet high in April; maturing a fair lot of seed.

I think that progressive farmers and stock owners should devote a little more attention to the preservation and culture of the best of our indigenous grasses. The above plant will show how quickly and easily good seed can be obtained, of this and other hardy perennial grasses, by setting aside a small and securely fenced enclosure of, say, an acre or even less; plough well and harrow fine; divide into chain plots. Sow the seed on the surface early in autumn. Success is certain. A few kinds will seed the first year, but the second year will be better. When ripe reap, hand-shake or thresh the seed. Then in autumn when the first rains come, scatter the seeds over the paddock on bare or burnt places. Thus in a few years at a small cost farmers may greatly improve their holdings.

In suitable localities, Paspalum, Trifolium, and other varieties of exotic grasses may be sown broadcast in the same manner, with very good results. For the drier districts small seed plantations of all the best kinds of saltbush should be established.

This is a very important question, which demands earnest attention, because overstocking and other causes combine to exterminate the best of our Australian grasses and fodder plants, which in the past have given our wool a world-wide renown for fine quality.

The young plants of "White Bokhara Clover" are sent for trial by those who may desire doing so. This variety is a hardy, strong-growing, and deeply rooting perennial, very much like lucerne in appearance, and the best of its class.

FIBRE CROPS.

By A. DESPEISSIS, M.R.A.C.

A self-contained country produces within the boundaries of its own shores most of the articles it requires in connection with its own industries.

In this respect Australia still stands far behind. Ropes, twine, and apparel which could and should be manufactured from home-grown fibre are all largely imported. No branch of agricultural enterprise has hitherto received less attention than the raising of fibre producing crops. Yet, they are, as a class, amongst the easiest to grow. They adapt themselves to a wide range of climatic conditions, require no very special skill or training on the part of the grower, and do not necessitate the same outlay in regard to buildings and machinery as other branches of farming require.

A number of fibre crops suggest themselves to the attention of the cultivator. Some in other parts of the world—in no way better favoured than we are—constitute staple articles of production and are a source of wealth to both the country and to those engaged in their cultivation and manufacture. The list is a long one and comprises Linseed Flax, Hemp, Cotton, Aloe fibre, Manilla fibre, Jute, New Zealand flax. They are all worthy of the attention of our settlers in some parts of this State as well as of other portions of Australia. This fact has been recognised by the Commonwealth Government, and in the Bounties Act, 1907, passed last session of the Federal Parliament, practical encouragement in the shape of liberal bounties is offered to those who will engage in the raising of flax and of aloe fibre. For that purpose provision has been made for the payment for periods ranging from five, eight, and ten years of the sum of £35,000, payable annually. This is made up of sums of £1,000 to £9,000 to those who may claim the bounty granted for the several classes of crops it is intended to encourage under the authority of the Act. The rate of bounty in the case of the two fibre crops alone, flax and sisal hemp, represents 10 per cent. on the market value of the production by the grower of a minimum quantity of 5cwt. linseed, and besides this, 10 per cent. also on the market value of a minimum weight of 5cwt. flax fibre; these quantities represent the yield in seed and fibre of one acre of flax. It is proposed to distribute in this way £13,000 during the next five years. In a like manner, a sum of £3,000 is also made available for the encouragement of sisal hemp, payable for the next ten years, in quantities of at least one ton, the product of about two acres.

The object of these notes is to draw attention and provoke a discussion on the merits of two valuable crops which need only be introduced to take a firm root.

Flax.

This name is given to an annual plant, with slender, fibrous stems which must not be confounded with New Zealand Flax (*Phormium tenax*) which belongs to the lily family and carries its fibre in its leaves; a plant very different in appearance to the real flax. It is cultivated both for its fibre and also for its seeds known as linseed and flax seed, which yield linseed oil or may be ground into linseed meal for feeding purposes. The residue after the extrac-

MAP OF WESTERN AUSTRALIA

Showing Rabbit Proof Fences.

Length of Fences No.1. 1139 Miles

No.2. 725 "

No.3. 171 "

Cordon
Mt. Blaze

Kimberley
Division.
Derby.

Cossack.

Onslow

DAVIES FRANKLIN
*Cycles are used by the
W.A. GOVERNMENT
for the Boundary Riders
all along these fences.*

Bluff Point

No 3 Fence

Northampton
Railway

Geraldton.

Yalgoo.

No. 2. Fence

Railway

Railway

Perth.

Cunderdin.

Albany

Nannine

Gum Creek.

No. 1 Fence

Burracoppin

Laverton.

Malcolm.

Menzies

Kalgoorlie

Esperance

Point
Ann

Starvation
Boat Harbour.



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And is SPECIALLY DESIGNED and EQUIPPED
so that it is adapted for . . .

ALL PARTS OF AUSTRALIA.



MESSRS. R. LENNIE AND A. WARREN,

Who rode from Perth to Sydney recently on

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Have you read what the
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ordinary weights and speed qualities in
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GEARS.



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tion of the oil is pressed, under strong hydraulic pressure, into oilcake, which is also used as a feeding stuff.

Climate.—Flax, like wheat, is a winter-growing plant which stands well wet and cold weather, but like wheat it only runs up and blooms in the spring after frosts are over. It is not, however, a cold region plant. Its home is said to be the country extending between the Persian Gulf and the Black Sea. It is mostly cultivated in Russia, France, Germany, Holland, and Great Britain or Europe. In America it is also largely grown in Argentine where, of late years, easy fortunes have been made by its cultivation.

Soil.—For its best development flax requires a warm, well-drained soil, friable and easily cultivated, and resting over a red clay subsoil. A surface soil rich in humus over a relatively moist subsoil is very desirable. The crop requires moisture, with numerous rains during the growing season. The seed bed should be clean, deep, and fine. It is thus seen that extensive areas of our wheat-growing country, in localities with a winter rainfall of 15 to 30 inches, are well suited to the linseed flax.

Seeding.—The quantity of seeds to the acre varies according to whether the crop is sown for fibre alone, for fibre and seed combined or for seed alone. The bushel of seeds weighs half a cwt., viz., 56lbs. Thick seeding, viz., $1\frac{1}{2}$ to 2 bushels, is the practice in countries where a fine fibre is wanted, such as is used in the manufacture of Irish linen. Medium seeding, viz., 1 bushel or a trifle over is found the best where the crop is required for both fibre and seed. Light seeding, viz., $\frac{3}{4}$ bushel or about 45 to 50 lbs., according to the richness of the soil, is preferable for seeds alone.

Cultivation.—The sowing is better done in the autumn when the ground is still warm, when germination will be rapid and the plant will establish itself firmly. The seeding can be done either by the drill or the broadcast machine; in the latter case it is followed with a light harrow and then with a roller if the ground is not very friable. Linseed may follow almost any crop that has been well manured, except turnips or beets. As the result of some investigations conducted in California it is calculated that a 2-ton crop of flax removes from the ground about equal amounts of potash and of phosphoric acid, viz., 40lbs. each, and also 74lbs. of nitrogen and 23lbs. of lime.

It would be desirable, therefore, in the rotation, to sow linseed flax after field peas, or some such nitrogen gathering crop, unless the ground is rich in humus, and to also give to the ground a couple of cwt. of superphosphate. It is important that the ground be clean. All rankly growing weeds must be pulled when the plants are seven or eight inches high. Long weeds such as wild mustard, dock and wild oats are the worst, as they are cut and bound up in the sheaves and are subsequently more difficult to remove.

Harvesting.—Crops sown in May are generally ripe in November. The time-honoured method of hand-pulling, which is slow and costly, has been found to be utterly unsuited to the exigencies of the Australian farmer. When a reaper and binder was first put in a linseed flax field by a Gippsland grower, would-be purchasers at the head of long-established firms declared that it would be no use offering the extracted fibre to them. Samples of imported plant-pulled fibre, and also of the same Gippsland farmer's fibres, were some months after submitted to them. They bought the whole crop at top market price. Their prejudice against the machine-reaped article has from that time disappeared.

Good marketable fibres are produced by a crop 2ft. 6in. to 3ft. high. The binder should be set as low as possible and the sheaves should be small and tightly tied for easier handling, when threshing the seeds.

Maturity is shown when the leaves begin to fall easily, leaving the stem clean and bare; also when the boles begin to assume a light brownish colour. The seeds inside the boles are then well filled out, of a brown colour, have a glossy surface, and are full in the boles or capsules. If reaping is delayed too long much seed will be lost by shedding, if done too early the seeds are liable to pinch and shrivel. After cutting, the sheaves are stood up in small stooks, when the ripening process continues. As soon as dry they are carted away and stacked in a safe place where farm stock, birds, and mice cannot do any damage.

The threshing, which should be done as early as convenient to prevent possible loss, can be done by pulling the small sheaves over a stout iron comb or rake fastened to a bench on which sits the operator. When larger lot is treated the operation is better done by machinery. A compact set of machinery costing about £70 and manufactured by the Melbourne firm, Cliff & Bunting, was two years ago bought by the Department of Agriculture. It was shown at work at the late Industrial Exhibition in Perth and has since been sent up to the Narrogin State Farm. These machines comprise a thresher, a breaker, a combing machine, and a scutcher. They are driven by a small oil engine and for the convenience of working they can be carried alongside the stack if so desired. After the seeds have been threshed they are run through a winnower, cleaned and bagged. The sheaves, still securely tied, can either be stacked almost indefinitely without injury or if the season is right can be subjected to the process of "retting" or rotting, whereby the gummy substance and the straw become detached from the fibre. Unless fibres of the first quality are required, "dew retting" proves cheaper and more convenient than the old process of steeping in tanks or in running stream still in vogue in some parts of Europe. The cost of labour involved by dew retting is set down at about 15s. for an average crop of one acre. After four or five weeks, the sun, rain, wind, dew, and also the moisture from the earth have sufficiently disintegrated the fibrous stems spread in even rows over the ground and the flax is ready for the breaker. The best time for retting is the autumn or the spring. Our summer is too dry, and often winter is too wet. Breaking is done by running the retted stuff between fluted rollers when it comes out ready for the next process, which consists in beating or brushing the useless straw off. This is done by the "scutcher," a machine which revolves like the spokes of a wheel without rim, just missing the rounded side of the feeding trough, and in so doing brushes off the straw and leaves the fibre clean. The flax at this stage is ready for packing. It is baled like wool and sent to the manufacturer or shipped away to market.

Flax in Western Australia.—The Department of Agriculture has for the past two years grown very satisfactory experimental crops of linseed on its State farms. Last year at Narrogin we had close on to one acre from which we threshed 10 bushels of seeds and have now the stems retted and awaiting the further process for the extraction of the fibre. At the Brunswick State Farm where we have every year 50 calves to rear, we require a quantity of linseed to add to the separated milk; for that purpose we sowed in May last five acres of linseed. The crop is one of the best I have ever seen and I would invite all those who intend to try this crop to go and see it from the blooming time on till reaping time—November.

From notes I have been able to collect, the following is a fair statement of the cost of production and the returns from one acre of linseed flax :—

<i>Cost.</i>							£	s.	d.
Rent per acre	..	..	..	..	..	..	0	5	0
Ploughing, harrowing, and seeding	..	..	..	..	..	..	0	15	0
Seed	..	..	..	..	..	..	0	10	0
Fertilisers	..	..	..	..	..	..	0	10	0
Weeding	..	..	..	..	..	..	0	2	0
Harvesting (with binder)	..	..	..	..	..	..	1	0	0
Threshing	..	..	..	..	..	..	0	12	6
Carting and spreading for retting	..	..	..	..	..	..	0	11	0
Gathering after retting	..	..	..	..	..	..	0	7	6
Breaking and scutching	..	..	..	..	..	..	2	15	0
Carting fibre and seed	..	..	..	..	..	..	0	5	0
Interest and depreciation of machinery	..	..	..	..	..	..	0	10	0
Bags and bales	..	..	..	..	..	..	0	15	0
Total	..	..	..	..	..	..	£8	18	0

<i>Returns.</i>							£	s.	d.
11 bushels linseed per acre at 14s. per cwt.	..	..	..	..	..	..	3	17	0
5 cwt. fibre at £42 per ton	..	..	..	..	..	..	10	10	0
							£14	7	0
							£8	18	0
Balance profit per acre	..	..	..	..	..	..	£5	9	0

MULE BREEDING.

By ALEX. CRAWFORD.

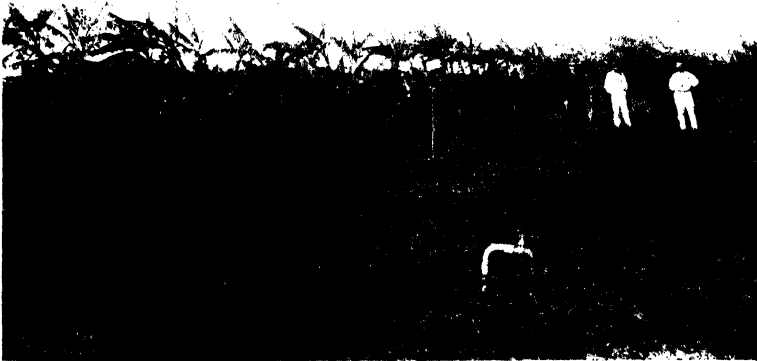
This is an industry, totally neglected in this State, which would be found to be very profitable. A few statistics would show the value attached to mules elsewhere. In France, for instance, there was one mule to every eight horses; in Italy, one mule to two horses; in Spain, two mules to each horse; in British India, one mule to each horse; and in the United States, one mule to seven horses. I am unable to get the average value of the mules and horses in Europe, but in the United States it was found that the average value of the horse is £14, and of the mule £17 per head. Hence the mule there is more valuable than the horse, and Americans are keen folk. The total number of mules is about three millions. They export £1,500,000 worth annually to the United Kingdom and elsewhere. France, on the other hand, imported £150,000 worth annually, and a great many of them came from Spain.

The foregoing facts convey an idea of the commercial value of the mule elsewhere. A mule is the progeny of a mare by a donkey sire. Breeding from the ass put to a stallion produces a jennet, which is inferior to a mule, the progeny taking after the donkey. The finest jackass is in Spain, where there are many varieties of asses, and the most prolific province is Catalonia. The Catalonian does not possess the size, but has quality, spirit, and style. Next comes the Poiteau donkey. He is larger, and rough-coated, of inferior spirit, and not such a good mule-getter. To breed mules commercially the essential is a good donkey sire. The United States possesses from 6,000 to 7,000 donkeys, entered in the Stud Book; they are worth from £30 or £40 up to 400 or 500 guineas a-piece. Everything depends on the size of the jack. A jack from 12 to 13 hands is worth £20 to £30, of 16 hands up to 400 or 500 guineas. But for ordinary purposes, for heavy draught work, the draught should be 15.2 to 16 hands. For lighter saddle and harness work jacks may be anything from 14 to 15.2 hands.

The main qualities to look for in a jack are size, bone, and weight. The frame should be high and compact. A light-framed and light-boned jack will beget an inferior mule. The weight should not be less than 1,100lbs. for draught purposes. In buying a jack for breeding purposes a guarantee should be obtained that he will cover mares, as many people here have introduced jacks at heavy cost to afterwards find they would not cover mares at all. Jacks permitted to cover female donkeys have often refused to have anything to do with mares. In one case a jack costing £350 was imported to South Australia eight or nine years ago, but begat no mules. It is useless to put a high-class jack to an inferior mare, as so much depends on her. In countries where mules are bred largely the best mares are sold for mating, and the finest mules are from mares that have a large proportion of the Persian Pecheran breed. To all intents and purposes they resemble the Suffolk in everything except colour. The finest mules bred in America and Europe are generally from well-bred mares of this stamp. It is not unusual there to see mules 16 to 17 hands high worth £80 to £100. Well-bred mares should be used for buggy and riding work.

The advantages of mules are manifold; they are immune from disease, practically; will travel and keep their condition where horses would scarcely keep alive. They are rather browsers than grazers, and prefer suitable scrub to chaff and oats. They will work hard and keep their condition on native scrub. I have proved that on wattle and mulga mules will do longer journeys than horses on chaff and oats. Recently, I had travelled 1,100 miles with two young mules, three and four years old, and though I had plenty of chaff and oats with me, whenever they came to the mulga and I wanted them to eat chaff I had to tie them up, as they preferred the mulga. At the journey's end the mules were in better condition than at the start.

The recuperative powers of the mule are greater than those of the horse, and two or three days' care of a mule will do more for him than a fortnight for a horse. He is longer lived than a horse, and will work many more years. They are steady pullers, and in this resemble bullocks rather than horses. They are ideal draught stock for farmers, especially for cultivation. Nearly all the agricultural colleges in U.S.A. keep a mule for drill work, moulding of potatoes and maize. Their suitability is greatest on the Goldfields, as they thrive on less water and attention than horses. They require little or no shoeing, and do well on native shrubs, and though not in apparent demand



CARNARVON.

1. Homestead.

2. Banana trees.

at the present time, yet they fetch good prices. On the rabbit fence one mule did more work than two horses. I had sold an outlaw to a coachdriver for £35, 14 hands high, and was offered £50 for the small pair I have recently been driving. The more the capabilities of the mule were realised the greater would be the demand for them. One mule belonging to Millar's Co. was imported at 100 guineas. In North Queensland there were many mules from 15 to 16 hands worth £80 a-piece. The worst (or best?) feature about the mule is that he will not race, which may account for English people not having gone in more for them. I am convinced there is a wide sphere for this animal on the Goldfields and in the agricultural areas of this State.

NATURAL GRASSES FROM PORT HEDLAND.

By DR. ALEX MORRISON, Botanist.

Dr. Cleland, President of the Natural History Society, Perth, during a visit to the North-West, made a collection of natural grasses found in that portion of the State. Specimens were submitted to Dr. Morrison, Botanist of the Department, whose report is given below. Some of the plants found by Dr. Cleland could not be identified owing to insufficient means for doing so.

Plants collected by Dr. Cleland in 1907 at Port Hedland.

5. *Chrysopogon Grillus*.—A native of the tropical and warmer regions of Australia and the old world generally.

6. *Anthistria Australis* ("Kangaroo grass").—Found all over Australia and Tasmania; a first class perennial fodder grass.

7. *Pappophorum nigricans* ("Black-heads")—A good fodder grass, found in all the Australian States and Polynesia; well adapted to the dry districts in which it grows.

9. *Eragrostis eriopoda*.—A native of the warmer parts of this State and North Australia generally; specially adapted to resist drought.

12. *Poa Billardieri*.—A rigid maritime grass found on the westerly and southern coasts of Australia and Tasmania.

13. *Eragrostis pilosa*.—An annual grass of almost world-wide distribution in warmer and temperate regions. It is very prolific and yields a large quantity of herbage, while its seeds have a considerable nutritive value.

14. *Sporobolus virginicus*, var. *pallida*.—A species found all over the world, generally on the sea coast. It is useful as a fodder plant, but is rather fibrous.

15. *Aristida arenaria*.—A wiry grass with forked awns which are somewhat objectionable; found in all the Australian States.

16. *Setaria verticillata*.—An annual grass, native of the warmer parts of Western Australia, and of the other divisions of the old world, supplying good fodder.

17. *Pappophorum gracile*.—Similar to *Pappophorum nigricans* (No. 7), and sometimes set down as a variety of it.

23. *Isotropis atropurpurea*.—A small leguminous shrub, found in the warm and dry parts of Western and South Australia. As other species of *Isotropis* are reputed poisonous to stock, this plant might also be suspected of having poisonous properties.

25. *Polycarpoea corymbosa*.—A herbaceous plant, native of the tropical and subtropical parts of Australia and of the old world generally, as well as of tropical America. It is generally placed in the Clove family (*Caryophyllaceae*), and does not appear to be credited in books with any special properties; but I have seen a plant resembling this received from the North-West, with the information that it was used by the aborigines for stupefying fish.

- (a.) *Cyperus vaginatus*.—A sedge found in all the Australian States. Yields a good fibre, and also a good pulp for the manufacture of paper.
- (b.) *Panicum gracile*.—A good perennial fodder grass; native of all the States.
- (c.) *Triodia pungens*.—One of the “spinifex” grasses, the flowering stalks supplying nutritious fodder.
- (d.) *Eriachne ovata*.—A native of this State and of South Australia; is somewhat wiry for fodder.
- (e.) *Eragrostis Brownii*.—Found all over Australia, and also in Asia; a first rate grass, resisting drought.

COLONIAL WINES AT THE FRANCO-BRITISH EXHIBITION.

REPORT OF JURY.

The Agent General for Western Australia has forwarded to the Premier a copy of the report of the Jury on Colonial Wines exhibited at the Franco-British Exhibition in London, which accompanied their recommendations for awards. The following is the text of the report, but the list of awards will not be published until after the session of the Superior Jury:—

The Jury now reporting consisted of British Jurors alone, and was constituted the Jury to examine and adjudicate upon the Colonial Wines and Brandies under the circumstances which are set forth in the following Memorandum. This was prepared by the French section of the Jury, translated, and submitted to Lord Blyth, Mr. Haig, and Mr. Yeatman, and by them signed as a correct statement of the points at issue.

Conference of the Jury of Class 60.

Called upon to join our British colleagues in examining the viticultural product of the British Colonies, we appointed on the 24th June a delegation which, under the direction of M. Jean Calvet, proceeded at 2 o'clock the same day to the Australian Building. At the first examination of the exterior of the samples exhibited the question of principle, in respect of the convention of Madrid, notably Articles 4, came to the front. The major part of the wines submitted bore indications which, in our opinion, might mislead buyers as to the origin so denominated. The French Jurors therefore referred the matter to their Presidents, MM. Kester, Turpin, and Mandeix. These gentlemen returning to confer with the British Jurors based their contention on the thesis maintained by France by all the Universal Exhibitions since 1900, a thesis which had been embodied in the formal orders of the day, adopted by the International Juries, Paris 1900, St. Louis 1904, Liege 1905, Milan 1906, Bordeaux 1907. These orders of the day may be summed up in the following resolution:—That with a view to commercial loyalty dear to every country, the examination of articles bearing false marks, and geographical descriptions which are not justified, and which are calculated to lead the public into error, should be strictly abandoned. The British Jury of which Mr. Haig was Chairman, without contesting the principle of the Convention, and basing their attitude on the internal jurisprudence of Great Britain, and on the declarations by the British representatives at Brussels in 1897, refused to see a violation of the Convention in the fact of the submission, for example, of an "Australian Burgundy," maintaining that the interpretation of the convention in this country permitted them to employ certain regional names followed by an indication giving the real place of origin. It is impossible for us to admit this interpretation. Desiring to testify our entire goodwill with our British colleagues we proposed them an amicable solution, viz., to take from them an undertaking that no use would be made in the future of erroneous appellations. On this condition we should have accepted to examine co-jointly the exhibits. After discussion, Mr. Haig with his British colleagues declared that no such engagement was possible. It was in consequence impossible to continue the work, that is to examine the products which we considered were not exhibited under their proper descriptions. We therefore withdrew, expressing the regret to our colleagues to be obliged by our jurisprudence and by our traditions to come to this determination.

The above is a correct translation of the Memorandum of the proceedings between the two Juries.

(Signed) BLYTH. CHARLES R. HAIG. HARRY O. YEATMAN.

This place in our report may therefore well be occupied by a few remarks on the conventional adoption of European names or descriptions by a very large number of the Colonial exhibitors. We are quite aware that such adoption has no other aim than to indicate to the consumer the type or nature of the wine, which the mere term "red" or "white" or even local names of places or vineyards could not convey, when these products of our Colonial possessions were first placed upon the market, but in our opinion the various wine-growing districts in the Colonies would best establish and maintain a successful reputation in the markets of the world, if their wines were described and known by names, proper to their own districts, and to which they could

claim the exclusive right. We take the opportunity here also of noticing that in many cases, not only do our Colonial brethren borrow their descriptions of their wines from the best known European districts but that they attempt the impossibility—as we hold it—of producing the various types approximating to those of Europe; and this within one limited locality, or indeed sometimes within the confines of a few contiguous vineyards. We venture to express our opinion, that this attempted versatility militates against the probability of obtaining the best results from the capabilities of the climate and soil of a particular district. We are quite aware that not only do the Colonial authorities, in theory, and by their counsel and warning, deprecate this feature of attempting too much, but that a considerable body of the wine-growers themselves are by example and precept discouraging this course of action.

We have ourselves indeed, not only sought by our awards to emphasise this view of the matter, but have actually found that our highest unanimous appreciation has been won by some exhibitors whose energies have evidently been devoted to the production of wines of the same nature, and not, for example, to the impossible task of producing within one limited district wines differing so widely as Port and Hoek. We might here mention in confirmation of this view that in New Zealand the small beginnings are apparent of the cultivation of a wine approaching the Bordeaux Clarets in lightness and delicacy, although naturally still a long way behind the Gironde. We may now place on record that we tasted all the wine quite regardless of their conventional descriptions, and that every wine and that every exhibitor received the full attention of the Jury. That Australian wine-growers have made great strides in the improved cultivation of their wines, and in their treatment of them, we are very glad here to testify that though many of the wines exhibited were under every disadvantage of storage here before submission to us, we are able to chronicle the fact that only one wine out of the samples submitted to us was unsound. We should also like to observe that, in the white wines especially, the growers of the Commonwealth showed some remarkably fine specimens, and we hope that their attention will be directed to this fact which in our judgment stands out prominently.

Signed for the Jury—

CHARLES R. HAIG, Vice-Chairman,

H. O. YEATMAN, Secretary,

FRANCIS WEBSTER, Reporter.

THE PIG ON THE WHEAT FARM.

By BUCOLIC (in *Morning Herald*).

It will not be expected that an ordinary grain farm can be converted into a wheat-cum-pig farm without some additional improvement in the way of buildings and fences. It is of the first importance in these matters that the pigs never be allowed to develop the habit of breaking out of bounds. This is a habit, and one for which the owner is wholly responsible by putting up divisions and fences in the first place which are quite ineffective to keep the animals back. It is frequently more by accident than intention that pigs discover they can get out of their pens, yards, or paddocks. The pig then finds that it is pleasant to ramble, and if he is successful in getting out on several occasions it will be found difficult to prevent him from getting through somewhere, for Dennis is a powerful animal, and the leverage of his snout has to be reckoned with by the pig farmer. On the other hand, he is easily checked at first, and if he does not accidentally find a way out or is not taught tricks by older pigs which have acquired bad habits, he will settle down and make himself comfortable at home. The man who lays himself out to study the nature of pigs will learn many points, which will enable him to manage them with the least possible trouble. He will discover, for instance, that the pig is an animal with a strongly developed sense of location, accompanied by the homing instinct. Although they dislike a change of quarters, they settle down to new ones in a few days. Their memories are short and 48 hours seems to obliterate all recollections of their previous domicile, but for 48 hours they may cause trouble in their efforts to return to the spot whence they came, if the fences be weak. These remarks are made to enforce the necessity on the part of the prospective pig farmer of making good fences and yards in the first instance. According to the appointments so shall the pigs be. It rests with the farmer to determine whether the farm shall be a smoothly-running establishment, where each lot of animals contentedly lays on condition, or a locality of internal discord and mishap, brought about by fence-breaking, fighting marauders.

On a farm conducted on the lines to be indicated, there will be less tendency on the part of the pigs to develop the aforementioned bad habits, as one of the main reasons for the desire of pigs to rove is discontent, caused by starvation, or near it. Hungry pigs are profitless animals, with a large capacity for mischief. Well-fed pigs are happy ones, with a large capacity for profit.

In planning out the piggery buildings, it will be advisable to divide the arrangements into two parts, which may be called the breeding department and the feeding department. The former should be located upon a warm, dry site, and its size will depend upon the number of sows that will be required to produce the pigs wanted by the farmer. It is generally estimated that a breeding pen is required for every three sows, and to each pen should be attached a good-sized yard. It is not proposed, however, to go into de-

tails over these points, as it is the system rather than any particular mode of carrying it out that is under consideration.

From the breeding department supplies of growing pigs are drawn and transferred to the feeding-paddocks, which may most effectively be ordinary arable fields, made pig-proof in one of the various ways of doing this. No other buildings than a good shed, not too high in the roof, with an abundance of straw in it, is required in these paddocks. Dryness and warmth must be secured for pigs if they are to do well and avoid disease. Wet and cold are responsible for nearly all the lung complaints and rheumatics and joint trouble in swine. On a wheat farm where straw is plentiful no pig should ever want a clean, dry, warm bed without finding it. The feeding methods are simple. Automatic feeders of the ordinary pattern are made according to the number of pigs required to be fed. They are filled with wheat, proper water facilities are provided, and the pigs are left alone until the feeders are empty, when fresh supplies are carted down, and the feeders filled again. Those who have not seen pigs fed upon this system have no idea what peaceful, orderly creatures pigs may become. There is no wrangling over their food; there is no need; it is always there. When they want it it is ready for them. They give up the habit of bolting their food down, and snapping at their neighbours if they seem to be getting more than their share. Under such conditions where, perhaps, a hundred porkers are dwelling together, two-thirds of the pigs, full and happy, are snuggled in the warm straw, dreaming or sighing with contentment, as they watch the remainder of their companions chewing lazily at the troughs and retiring one by one with bulging stomachs which refuse to hold another grain. Such a piggery is as unlike the ordinary piggery as a well-managed household is unlike a blacks' camp. Those who have been accustomed to feed pigs on a minimum of food, and begrudgingly at that, may regard such a system as fancy of an impractical man, but the mistake is on their part. Neither science nor practice will justify the ordinary methods which have brought pig-keeping into evil repute, while, as will be seen later, both science and practice endorse the system indicated.

FEEDING THE PIG.

It was said that the system of feeding advocated in the previous article of this series was endorsed by both science and practice. Before examining the feeding principle at issue, it may be as well to take the case of the other man, the man who doles out a ration parsimoniously. It has always seemed difficult to comprehend by what process of reasoning this man expects his pigs to grow satisfactorily. No more than a man may add a cubit to his stature by taking thought unto himself may a pig grow by thinking of the food which is denied it. The only thing which can produce growth is the conversion of certain forms of matter into other forms. It should be unnecessary to call attention to such obvious fundamental principles of feeding, but no one who is fully cognisant of the ways of some of the feeders in this State will deny that their methods disregard the most basic points of common sense. It is easy to pick out at a glance the pigs kept by such men. They have a type of their own. At a little distance off, few would identify them as pigs at all. There is twice as much daylight under them as there should be; their

pinched, undeveloped bodies demonstrate atrophied organs; their outline is that of a dog, rather than the round, fat, meaty shape of the well-fed, well-bred hog of commerce, by the production of which alone a profitable pig industry will be brought into existence. Want of sufficient food is the cause of these miserable objects, which remind one of the victims of an Indian famine in their shrivelled outline. Frequently we have said that no stock industry was yet built up without an abundant supply of suitable food, and there is neither any hope of success to the individual without it. It is important to get rid of the idea that without liberal feeding good results can be obtained with any farm animals. It is extraordinary how tenacious is the belief that liberal feeding is wasting feed. Certainly, if a pig, or other animal, is given more food than he can assimilate, the excess is waste, but the limits of a pig's digestive capacity are not easily reached, providing its food be supplied in suitable form. The endorsement of science to the principle of liberal feeding has been subscribed on more than one occasion in this column. It is, however, worth repeating, and may be made most comprehensible by being stated in figures which illustrate the working of the principle. Assume that 1lb. of food is required each day by each animal to support life—that is, the amount of food which would be needed to keep a pig alive, neither gaining nor losing in condition. Assume again that 5lb. of, let us say, wheat, are required to produce 1lb. of pork. The feeder who feeds in scant measure feeds, say, 2lb. per pig per day. Each day half the ration is absorbed in repairing the waste of the tissues, 1lb. of wheat only being available for making increase. It will, therefore, require five days' feeding to make a gain of 1lb. of pork, or 500 days to make a gain of 100lb. On each of these days 1lb. of wheat has been eaten with no other result than keeping the pig alive, as 500lb. of wheat have been eaten without showing a profit.

Compare this with the result obtained by feeding 6lb. of wheat per day. The margin for daily gain is 5lb., which will produce 1lb. of increase per day, or 100lb. in 100 days. In this case only 100lb. have been consumed unproductively. In the former case, 1,000lb. of wheat were used to make 100lb. of pork; in the latter only 600lb., or little more than half, were needed to produce the same result.

Such, then, is the philosophy of liberal feeding. Its only limits are the limits of the pigs to digest, and experience has shown that these are wide. For this is the function of the pig that it can digest large quantities of rich foods quickly and thoroughly, and the wheat-grower with his 1,000-bag crop to consume must understand that the more quickly he gets it eaten by the young pigs, the less of it will be unproductive, and the greater will be his profits. One need only refer to the practice of the pig-feeders of England, Germany, Denmark, and the principal pig locations in the United States for a full endorsement of liberality in feeding by the men who have established enormous industries upon their labours. It is only in Australia pigs are expected to grow fat upon hearing one another squeal.

CONCERNING BREEDS OF PIGS.

It is hard to say how many different breeds of pigs exist. Every country in the world where swine are kept has its special breeds, and each of these has its set of admirers who regard their particular breed as the best of all possible breeds. England, North and South America, Germany, France, Nor-

way, even China, have breeds peculiar to themselves. With us, however, the breeds which may be regarded as of local importance are the Berkshire, the Large Black, the Large Yorkshire, the Tamworth, and the Middle Yorkshire. At one time the Poland China is said to have been kept in considerable numbers, but, except for the evidence afforded by the indication of the breed in an occasional mongrel sow of ancient appearance, there do not seem to be any specimens left in the State.

There is no question concerning the popularity of the Berkshire in the present state of the industry, and for a general purpose pig it is questionable if there is any breed likely to give the same all-round satisfaction. It must be remembered that in the following remarks reference is made to pure-bred animals of the different breeds. Many possess pigs having external resemblance to the breed, but which can make no lawful claim to purity of descent. In considering the claims of the different breeds it will be useful to emphasise the question of type as it affects their general characteristics. As in cattle, there are two distinct types, the beef and the dairy types, so in pigs are there two equally distinct types, which may be termed the pork and milk types. Any man who has a clear conception of the guiding differences between the conformation of the opposing types in cattle will have no difficulty in recognising the same in the pigs of different breeds. We say "opposing types." It is well to bear in mind that the capacity to convert the food into flesh and the capacity to convert the food freely into milk are matters of opposite constitutional tendencies, and the recognition and admission of this great breeding principle are as necessary to every man who studies commercial pig-keeping as to the breeder of beef and dairy cattle. The Berkshire, as goes without saying, belongs to the pork type. It is a good feeder and puts on flesh easily. It puts its flesh on in the right places. It pleases the butcher and the consumer. Its carcass is compact, shapely, and the bone is reduced as far as (sometimes further than) safety permits. It has all the best meat features. The Middle Yorkshire is the other of the locally kept breeds, which can fairly be called a breed of the pork type, but it has several disadvantages which the Berkshire has not.

The other three breeds, viz., the Large Black, the Large Yorkshire, and the Tamworth, are of a very distinct type to the other two, and belong to the milk type. The differences in the two types are outstanding. The frames are more conspicuous, the points are larger, the flesh covering is lighter, the legs are longer. The shape of the body is flatter, deeper, and narrower than the compacter, solidier, broader body of the pork type. The temperament is also different. The pork breeds are dull, phlegmatic, lazy by disposition, and the milk breeds are alert, active, and nervous. In this matter also the analogy exists between the two types in cattle and pig breeds.

It is due to the operation of this great principle that it is found that sows of breeds of the pork type are not such good breeders and milkers as the sows of the other breeds, and just here is the weak spot in the Berkshire. The number of pigs in the average Berkshire litter is low, and the sows are incapable of suckling large litters as successfully as the sows of the "milk" breed. Sows of the other type are very prolific, and are able to rear ten pigs as well as the average Berkshire or Middle Yorkshire can rear six.

For these reasons the most satisfactory results are obtained by crossing sows of the "milk" type breed with boars of the pork type breeds. The advantages of this system of crossing are apparent. The litters are large and

the piglings well nourished; their shape, following the lines of the male, approaches the pork type. Such a method takes advantage of the best characteristics of both the types used, while the vigour which is acquired from the act of crossing gives an additional benefit to the progeny of this system of mating. It goes without saying that reference is made to the crossing of pure-bred animals only, and the full benefits of the system are unobtainable when other than pure breeds are used on either side.

MANAGING THE LITTER.

There are different ways of rearing a litter of pigs. Some breeders who, by the way, soon become notorious for the lack of quality in their pigs, simply allow the sow to struggle along as best she may on whatever she can pick up. She is unable to discover nearly enough nutritive material to provide milk for her greedy progeny, whose constant craving is for nourishment. She gives up to them all the spare condition that had been stored in different parts of her body in the effort to feed them well, but Nature has set definite limits, and, however anxious the sow might be to provide milk for her piglings, she can only convert foodstuffs into milk; and, if the material is not forthcoming, neither is the milk. So the unhappy animal who has to forage at this period falls away to a mere bone-filled skin, and the piglings, after six or seven weeks of worrying and struggling at the maternal founts, reach the weaning age, poor in condition, stunted in growth, and woebegone in appearance. Such pigs may, in a sense, be profitable. They have cost absolutely nothing to produce, and, miserable-looking and stricken though they are, they are worth something, and that something is profit. But it is not pig-keeping, and we would like to see the Society for the Prevention of Cruelty to Animals deal with the man who allows a sow to get into the state sometimes seen for want of proper food. The pig-keeper should do a little thinking concerning the work his sows will do for him under proper treatment. A well-reared young pig at weaning time, say two months old, will scale anything between 30lb. and 40lb. live weight; anything below 30lb. is bad, and a considerable percentage should be well over 40lb. Assume the sow to have reared 10 pigs, then in two months she has produced something like 350lb. of pig, or, approximately, an equivalent to her own weight. This is surely a remarkable performance, compared with what is done by other farm stock; but without adequate feeding the result cannot be achieved. The man who is fully seized with the extent of the work which the brood sow is called upon to do in rearing a large litter of pigs will not deny her ample supplies of the materials from which she prepares the milk for her imperious youngsters, whose appetites seem everlasting and insatiable.

For the first fortnight after farrowing only moderate supplies of food are necessary for the sow who has generally abundance of milk for the pigs at that age. Food should consist first of a supply of greenstuffs limited only by the sow's inclination. The concentrated food may be given in many forms, according to facilities for obtaining it, but crushed wheat or pollard is quite satisfactory, especially if it can be mixed with separated milk. As the pigs grow and make more vigorous demand upon the mother the ration of concentrated food should be increased gradually until during the fifth and sixth week of suckling the sow is receiving three times as much good, thick slop as

she can consume. After the sixth week the ration should be gradually reduced until weaning time, when for a day or two only dry food should be given to the sow. If the sow is yarded, a supply of charcoal and cold water should be always accessible by her. It is a mistake to give her her food too thin. A thin porridge-like consistency is about right. Should her system require more water, she will procure it from the water-trough. So much, roughly speaking, for the sow. The little ones will not require any attention for the first three or four weeks, but they must be watched when they begin to eat from the mother's allowance. Young pigs learn to eat either from the example of the mother or other older pigs with which they associate. The earlier they are taught to eat the better, provided "scours" and indigestion are avoided. The writer is of opinion that young pigs are best kept away from slop foods until their stomachs have received some education in dealing with other foods than milk, and nothing is so safe and so good for young pigs to learn eating upon as whole wheat or peas. They are easily taught to eat either, by occasionally throwing a handful down in the pen. The sow will set them an example they will soon follow. When they have learned to nibble and chew the grain, a trough containing wheat or peas should be provided for them, to which the larger pigs have not access, and, after they have been feeding on wheat for a week or so without exhibiting signs of scouring, occasional allowances of pollard porridge can safely be made. But wheat and water should be available to them at all times they may desire them, and it will be found that, when weaning time comes, the pigs will be already paying more attention to the wheat and pollard than to the mother, and the withdrawal of her altogether from their food supply will take place without them exhibiting any concern. Pigs so treated should come out about 40lb. live weight in two months, and if the system be continued for another two months, they will be prime, solid porkers, full of meat and weight, pleasing to the eye of the butcher, and profitable to the grower.

WHAT TO LOOK FOR IN A BROOD SOW.

It is not such a difficult thing as might be expected to go into a piggery with a large number of the usual crossbred and mongrel sows and pick out the sows which produce the best litters. Milk production and general maternal capacity are associated with certain characteristics in pigs as in dairy cattle, and a little study of type in pigs will enable anyone to pick out the most profitable sows to use for breeding purposes. Before indicating what to look for it might be as well to state that there should be no second look at the pretty little sow. She is a charmingly picturesque animal, round and beefy, small points, and fine bone, just the sort of pig to make a carcase butcher glad, and such is her best destination. In the breeding pen her litters will be small, her milk secretion will be light, and her progeny will not develop with the intensity of vigour which is the best thing to drive pigs to a profitable death. The refined Berkshire is a good illustration of this type, and should be avoided in the breeding pens. It will be found that in most instances the sow which is the very antithesis of this is the best parent. Her body is long, deep, and comparatively narrow. It should be remembered that the digestive organs of the brood sow play, perhaps, the most important part in her career. They are called upon to do more work at certain times than the digestive

organs of any other animal, and the success of her litters is largely determined by the amount of food which they can make ready for conversion into milk. Hence it is that length and depth in the body are exceedingly important features in a sow for breeding purposes. The next thing to look for is a well-formed udder, free from badly-developed patches or calloused parts. The phlegmatic, sleepy sow is to be avoided. Good mothers are generally somewhat nervous, like dairy cows. Milk secretion has been proved to be largely a nervous function, and the dull, somnolent sow is seldom a mother of high order. A good backline is a useful point. Hollowed backs are not safe; they should at least be level, and, if slightly arched, so much the better.

Many, when choosing sows, avoid those coarse in their points, but this is a mistake, for the type of sow referred to is generally somewhat coarse about the head and long about the legs. The latter point is a good one, for, unless such a sow had longish legs, it would be found that as she approached farrowing time her udder would become chafed and sore from contact with the ground. The best brood sows will generally be found to be "clean" in the jaw and shoulder, their head, neck, and shoulder suggesting those of the Jersey cow. It is thus seen that the sows recommended for breeding purposes are not the least like the animal which they are required to produce for the butcher; indeed, they may be said to be the opposite type. Consequently the boar should be a good specimen of the meaty type, like the Berkshire. It will be found that the offspring take after the sire largely in external form, and the vigour, constitutional strength, and digestive capacity of the mother will be inherited to the resultant benefit of the breeder.

COOKING FOOD FOR PIGS.

Ever since pig-keepers have been there seem to have been mixed opinions concerning the value of cooking for swine, some urging it, others believing it to be a waste of time, fuel, and labour. There are two ways in which pigs may benefit from being fed cooked food, one being the warmth of the food, which is a considerable factor in cold weather, the other being the changes brought about in the tissues of the food by cooking. We do not propose to enter into the lengthy discussions that have waxed over this contentious subject, but we may draw one or two generalisms which may be useful in guiding our farmers. It will be found that most of the English and European feeders prefer and practise cooking the food, and that the chief opponents to the system are the American feeders and experimentalists. These latter have demonstrated again and again, to their own satisfaction, that cooking the food does not enable the pig to make better use of it; indeed, the results have frequently shown that the pigs fed on cooked foods gave inferior returns compared with those fed on the same foods uncooked. American feeders advocate soaking grains, instead of cooking, and the feeding of other usual sources of pig-food in the raw state. In very cold weather food is found to be more beneficial if fed warm, because it enables the pigs to keep warm with a much lower consumption of the carbohydrates and fats. There are some feeders who believe in feeding food in process of fermentation. Equal quantities of crushed grains and pulped vegetables, such as pumpkins, turnips, mangels, and the like are mixed in heaps upon the feeding-room floor until fermentation sets in well, when the mixture is fed to the animals. They claim to get

the best results from the system that they can get from any. But there are plenty to swear that they get by far the best results from cooking, and as many again to make solemn affidavit that cooking pig-food does not pay for fuel.

PIG-FEEDING.

The feeding of the brood sow should be so conducted that after she has been removed from her previous litter low in condition from suckling she should gradually pick up condition during the four months that will elapse before the next litter arrives. At farrowing time every sow should be in strong condition, say half fat. It will require by no means liberal feeding to effect this, and, provided she has an unlimited amount of bulk foods, such as good herbage pastures, roots, pumpkins, or such-like, no concentrated food need be given until a month previous to farrowing, when a small daily ration of pollard, wheat, oilcake, or kindred food should be allowed.

If slop foods are fed, not more than the pigs will clean up thoroughly should be given, always remembering to increase the rations gradually as the pigs increase in size. A properly fed pig will always carry a nicely-developed belly, and not exhibit the shrunken abdomen of the animal whose organs are shrivelled and atrophied for want of exercise of their functions. Symmetry of conformation is a useful clue to the feeder. But no man need be afraid to feed too much who is careful not to induce food sickness, which is indigestion in his pigs. The art of feeding requires attention and study.

Thrice daily may be taken as the usual frequency of feeding. The younger the pig, the oftener it requires feeding. Twice daily is ample for full-grown animals, excepting suckling sows. In fact, once a day is sufficient if plenty roughage is provided. Feeding in dribs and drabs is a bad method.

COTTON CULTIVATION IN QUEENSLAND.

The *Queenslander* says:—"Mr. D. Jones, cotton expert, has just returned from a visit to the Rosewood and Lockyer districts where he has spent ten days in promoting the cotton interests. Mr. Jones speaks hopefully of the prospects of the crops for the coming season. It is stated that a very much increased area will be under cotton owing to the stimulus caused by the keen local demand for fibre, as well as the very lucrative returns of last year's crop. Several especially good crops have been noted, ranging from £8 to over £10 per acre. One grower at Rosevale, farming 1¼ acres of cotton as an experiment, received (including the Federal bonus, which is 10 per cent. on fibre and seed) a gross amount of £14 17s. As one man can, with modern implements, cultivate from twenty to twenty-five acres and gather cotton from fifteen acres alone, there is margin of profit superior to many other crops farmers are now engaged with. Many farmers have applied for seed and are keen to test for themselves the value of the industry."

“TOP FEED” IN MURCHISON AND GASCOYNE DISTRICTS.

(Analyses by E. A. MANN.)

Two samples of “top feed” brought by Mr. A. R. Richardson, of Lowlands, from the Murchison and Gascoyne districts have been analysed by Mr. E. A. Mann, Government Chemist, for the purpose of ascertaining their nutritive value as fodder plants, and reported on by him as follows:—“These plants, which are supposed to be well liked by stock, are described for present identification as (No. 1) Wanyoo Bush, or ‘Sugar Brother,’ with roundish leaf. (No. 2) a species of Wattle, with broad leaf. It is stated that this ‘top feed’ keeps sheep in good condition when all grass has disappeared during drought periods.

[Analyses.]

“The following is the result of analysis of the two samples of ‘top feed’ from Murchison and Gascoyne Districts:—

	No. 1 Wanyoo Bush.	No. 2 Species of Wattle.
Moisture	1.49	1.83
Ether Extract	2.42	4.15
Albuminoids	13.63	14.19
Fibre	45.23	45.04
Ash	2.30	2.58
Nitrogen Free Extract	34.93	32.21
	100.00	100.00

“Unit Food values according to Dyer’s scale:—

No. 1, 73.45; with 10 per cent. water	67.13
No. 2, 76.22; with 10 per cent. water	69.88

“Comparative food values of—

Wheat	103.85
Rice Meal	117.85
* Oaten Hay	70.85
* Mixed Grasses and Clovers	76.98
* Mixed Grasses only	69.28

Of course, the figures showing food values have to be taken with the usual reservations to be made in such cases.”

* With 15 per cent. water (Henry, pages 621-2).
 Protein ... 9.3 }
 Ether Extract ... 2.3 } = 66.84 Food Units.

OUR GUM TREES: THEIR GREAT VALUE.

By J. W. ARCHIBALD.

Recent research has added much to our store of knowledge of the leaf and bark constituents of the Eucalyptus. In the following notes the writer offers nothing new or original, but hopes that a cursory survey of some of the economic aspects may be of interest. Most of the chemical data given are drawn from the work of Mr. Henry G. Smith, F.G.S., to whose interesting paper in the *Journal of the Society of Chemical Industry* the reader is referred.

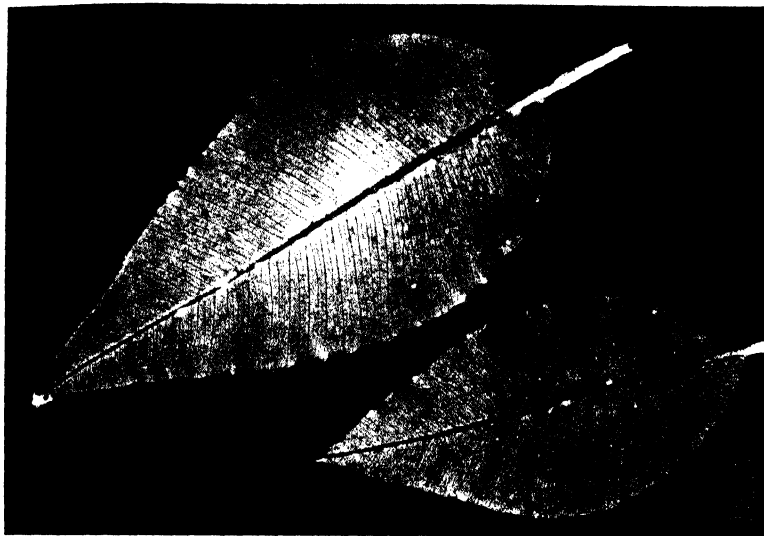
The Eucalyptus is essentially an oil-bearing tree. The character and abundance of the oil is subject to great variation, but the inference to be drawn from our present knowledge indicates that the constituents are constant for any given species. Those species, which are richest in eucalyptol, and whose kinos (gums) contain the most valuable tanning properties, are prominently represented throughout the highlands of this State. Our Salmon Gum, Mallet, Morrell, and Ginletwood not only occupy with the highest the foremost place as abundant oil-producers, but also their bark contains large quantities of tannin in a form, or in association with other bodies, that may give it a peculiar commercial value.

As we move eastward from the coast into the rich red soils furnished by the older rocks, the lighter soils are generally covered with scrub, but the great belts of rich, red loam are made green and pleasant to look upon by the growth of gum forests; and with few if any exceptions all the trees of these forests belong to species which might furnish leaf and bark products of commercial value. Their growing leaves contain, according to the particular species, from 2 to 4 per cent. of oil in which eucalyptol is the principal constituent, and their barks range up to as high as 18 per cent. of tannin, which, in the case of Mallet, has already been proved to suit industrial requirements.

This is the country which is now receiving the attention of settlers, and thousands of new holdings are being cleared. Splendid is the energy of the man, fresh on the land, filled with enthusiasm to reclaim for his own a steading where fields of corn shall delight the eye, and increasing flocks secure a coveted independence for to-morrow. Before the army of men thus engaged, the eucalypts are vanishing. During aeons of time, longer than men can count, they have occupied the land, and in the constant life struggle through dry summer months have evolved species wherein the oil glands have become highly developed. Before the woodman's axe to-day whole forests disappear and their place knows them no more. Further east the wholesale destruction of the forest proceeds with fevered haste. The recent prominence given to the conditions of the firewood supply industry of the Goldfields reveals how great is the area of forest country being daily cleared to provide the necessary fuel supply. In this case, however, for the eucalypt is very tenacious of life, and not having been ringbarked before felling, a considerable growth from young shoots is taking place, which, if it does not replace the original forests, may at least provide some firewood.



Red Gum (*E. calophylla*).



Crimson Flowering (*E. ficifolia*).

The species here met with are specially rich in oil and tannin. The Gimletwood has only one equal in all Australia as an oil-producer (*E. Amygdalina*, the Giant Gum of Victoria and Tasmania, contains 4 per cent. oil in the leaves; the oil carries little eucalyptol, phellandrene being the chief constituent), while the Gimletwood contains 4 per cent. of oil (of which eucalyptol is the principal constituent), and its bark, though somewhat thin, contains as much as 18.6 per cent. of tannin, in which respect it is even richer than Mallet bark, and its tannin is of similar chemical composition. The timber of this species is in great demand for mining lathes; so much so, that is complete denudation from all lands within reasonable distance of railway lines is but a matter of a few years.

As oil-producers Morrell, Salmon Gum, York Gum, and Mallet are but slightly inferior to the Gimletwood, but further investigation is wanted in the character of the kinos of these species before it could be definitely stated that the tannins of these barks could be made available for present industrial requirements. Of the barks of these species at present only the Mallet affords a commercial product; but recent research gives us room to hope that the known tannin contents of the species named may shortly be made available. Already an excellent tannin extract has been made from the Gimletwood, and it is difficult to account for the reason that this bark has not already taken its place as a valuable commercial article.

The wholesale waste of these valuable products is a matter of grave concern, and the question of the availability of these sources of wealth for commercial purposes is worthy of more than passing notice. If these products can be made commercially available they will form a very convenient source of income to the settler in supplying him with an industry to his hand that might provide him with the means to carry on with.

It is quite possible that some of the country of our eastern tablelands, now occupied by spontaneous forests, would yield equally valuable returns from the product of the gum trees, as will be the case when the forests are removed for the purpose of growing cereals, and in spite of the fact that such natural forests now occupy the richest belts of country eminently suited for agriculture. The question of the artificial culture of gum forests is receiving considerable attention elsewhere, notably in America. In California one grower has a plantation of 900,000 gum trees. The species almost universally adopted abroad till lately was the Tasmanian Blue Gum (*E. Globulus*), but as the chemistry of the leaf and bark products has been investigated, other species are receiving attention, so much is this the case that the collection of the seeds of some of the species peculiar to this State might with profit be attended to.

A brief survey of the Eucalyptus generally is warranted by a consideration of the industrial wealth-producing aspects of the case. After all, we may make such a survey with some pride, for the gum is a typical Australian product covering the Continent. On our humid foreshores there is no malaria and the healthy gum affords proud examples of the loftiest trees in the world. On exposed mountain ranges we delight in the shelter of its unsurpassable timbers, and over great arid reaches of the interior the evergreen foliage greets the eye from far-off, assuring to the traveller some restful shade.

The Eucalyptus belongs only to Australia, including Tasmania, which land, indeed, produces some species that might rival our own Karri for height. Australia, particularly this South-Western corner, is still the home of several

species of plant life that, now extinct, once grew in other lands, but the eucalypts are and have been only Australian.

There are no less than 200 species of the Eucalyptus already classified, and of which the principal constituents have received careful scientific and chemical investigation. Inasmuch as the great number of varieties transmit their characteristics to their offspring, they may be regarded as separate species produced by the slow process of evolution. When we consider how long it takes for any one species to distribute itself over a large area, we can begin to realize but dimly the long period of time that the gums have occupied the land; slowly from the spontaneous variations and cross-breeding, evolving some surviving types adapted to different conditions of climate and soil, and in the process developing some attributes unknown to any other genus in the great plant world. Thus the Mallees have developed a habit of secreting *oxalate of lime* in a most remarkable manner. The kinos, or gum exudations, have characteristics of their own, and though the oil from some representatives of the earlier species resembles the oil of turpentine, the eucalyptol and phellandrene bearing oils of the more recent species are characteristic of the great gum tribe only. The oils are essentially leaf products, and vary much in composition—about 30 known constituents have been chemically examined. All these constituents do not occur in any one species, but though closely allied varieties may show some differences. The composition of the oil of any given species is constant, even under the great variety of soil and climate that the given species may cover. This observation is also true of the kinos, or gum contents of wood and bark, so that for any given species after examination it may be definitely stated that, wherever found or raised, its leaves will contain a certain percentage of oil of a specific character and chemical composition; that its kinos would be of a known type, and the bark contain a known percentage of tannin of a specific composition. This comparative constancy of the products of any one species may be regarded as the great chemical truth underlying the whole question from an economic standpoint.

The young growth of any species, either from young plants or shoots, will yield a similar product to the mature plant, and generally a greater abundance of oil. As having a material bearing on this question we are all familiar with the fact that the Eucalyptus is a sturdy grower and tenacious of life, so when cut down will generally send out a vigorous growth from the stump. Such growth is handy for collection.

A chemical examination of the oil products shows that they can be divided into three main groups, and in the light of recent research the constituents of the leaf and bark products might take a more prominent place in the classification of the whole family. So constant is this relation that, given any sample of oil, a chemical examination might define which species it was derived from. In fact, we might build up the whole genealogical tree of the family by a study and classification of the oil and the bark products. During the evolution of the species, the appearance of the variable constituents of the oils has been contemporaneous with the alteration in the vein structure of the leaves; so it follows that the general characteristics from an oil-producing standpoint are apparent from an examination of the leaf structure. The three groups into which the oils are naturally divided are determined by the preponderance of one prominent constituent. As new bodies appear we find the principal oil constituent of earlier varieties gradually replaced by a



Flodded Gum (*E. radis*).



Mallee, Red Flowering (*E. pyramiformis*).

fresh leaf, and contemporaneously the vein structure of the leaf alters. This interesting and important circumstance is illuminated by a glance at the typical illustrations herewith made by direct sun prints from local species.

In the early members of the genus the leaf exhibits the general characteristic of a thick mid-rib, and the marginal view is close to or coincident with the leaf margin. The venation of the leaf gives the appearance of a feather.

Leaves of this type denote that the oil contents belong to the Terpene group. Eucalyptol and phellandrene may be present with many other constituents, but the predominating oil is terpene. Some of these oils are very similar to oil of turpentine. In some species the oil is very aromatic, resembling oil of lemon, and has little resemblance to ordinary eucalyptus oil. These oils are in demand for flavouring essences for scented soap, perfumery, etc. This early group has one prominent representative in this State, the Red Gum (*E. Calophylla*), one of the most handsome and best shade trees of the whole gum family. The leaves occupy a more horizontal position than those of other species. The crimson flowering gum (*E. ficifolia*), noted for its umbrageous foliage and gorgeous flowers, is closely allied, and perhaps the only other representative in this State of the ancient type.

Coming down the life history of the genus we find eucalyptol becoming the principal constituent in the oils, and a new body called *Endesmin* occurs in the kinos; which is to be especially remarked, for it is only where *Endesmin* is prominent that the barks are as yet of any value for tanning purposes. With the change here noted in the alteration of the leaf and bark constituents the contemporaneous alteration in the leaf venation is again characteristic. The mid-rib is less pronounced, the marginal veins have receded some short distance from the leaf margin, the venation has lost its feathery appearance, and the veins are occasionally branching, the leaf pulp has thickened to make more room for the oil-cells which are very numerous.

The third group yields oil in which phellandrene is prominent and the eucalyptol, if present, in much diminished quantity. In this class the leaf is again characteristic. The mid-rib is flattened and less prominent, the marginal vein has receded further from the leaf margin, in fact, and in some cases a second marginal vein occurs and the venation of the leaf now shows a marked divergence from the early type. The feather-like structure has disappeared and a lace-like arrangement of the veins is most pronounced.

(The illustration herewith is from a drawing in Baron von Mueller's Eucalypts, no fresh leaf from a species of this type being available. The sun prints are only effective when the fresh leaf is used).

There are about 80 species of the Eucalyptus already classified in this State. Some of these, as the Crimson Flowering Gum, the Tuart, and the Karri, have a limited habitation, while other species have covered a great area. A few species, indeed, are common to the whole Continent, but most of our well-known species are peculiar to certain areas in Western Australia. Referring to the group in which eucalyptol is the principal constituent in the oils, we have many examples, and several of these species cover a comparatively large area of this State. The Mallee and its closely-allied kindred species the Gimletwood, Morrell, York, Salmon, and Flooded gums are in this connection the most interesting, as they are all generous oil-bearers. Perhaps of all these species the Gimletwood comes first, averaging 4 per cent. eucalyptol in the green leaves, and as the bark of the species also contains the highest percentage of that tanning property which gives value to the Mallet bark, it is

particularly worthy of some special notice. From its habit of growing in dense thickets or forests of moderate height, it is a species that would present little difficulty in the collection of the leaves. The timber is unrivalled for many purposes. Combined with great strength it is durable and of straight-growing habit, giving it a special value for mining lathes, etc. If these trees were cut at the right season a plentiful growth from shoots could be relied on.

Probably in view of the value of the timber, leaves, and bark combined, the cultivation of this species in days to come will be undertaken. (The supply of suitable lathes for the mining industry alone will present some difficult problems in the near future.) The timber could be sold for lathes, the leaves used for producing a high grade eucalyptus oil, and the bark dried for tanning purposes. At any rate, certain belts now covered with spontaneous forests of the species might with advantage be preserved for this purpose. We are familiar with the case of men holding land for 20 years for an increment in value; but in view of an approaching universal timber famine, it would seem likely that those farmers who can preserve a suitable belt of forest country for the market requirements of a few years hence will find it more profitable.

The manufacture of eucalyptus oil in this State has been carried out on a small scale with crude appliances. It appears probable that if carried on in a larger and more systematic way the cost of production could be materially lessened. The trees are now being felled for other purposes, and the collection of the leaves under these conditions could be done at a minimum cost; in fact, the leaves will readily fall from the stalk when partly dry, and a cheap and efficient method of collection would be found by the ordinary bushman. Young shoots growing from cut stumps could be conveniently gathered. The oil percentage referred to is in the green leaf which contains about 40 per cent. moisture. The leaves should be treated with steam, as the most efficient way of extracting the oil contents, and the product further recovered in a condenser.

Investigations undertaken to determine the time required for the distillation of the various leaf products show that practically the whole of the eucalyptol comes over in the first two hours, though the heavier and less volatile constituents, as aroinandendral, etc., require further time. This would show that in the production of an oil rich in eucalyptol some of the heavier products might with economy be left in the still. This consideration would not apply to some of those oils that are in demand for perfumery, etc., as the slower distilling constituents have the higher aromatic value—also greater specific gravity. The comparatively short time that is required for the recovery of the bulk of the valuable products suggests that, with an intelligently designed plant, large quantities could be cheaply handled, and an output of oil made at a cost much less than is shown by present methods. The minimum cost of production from certain varieties at present is from 3s. to 4s. per gallon. The ideal condition of manufacture would be met by a central plant adjacent to the railway line, where the extraction of both leaf and bark products would be undertaken on a commercial scale, under efficient chemical supervision. The leaves gathered over a large area could be forwarded to the central mill, and probably a tanning extract from the bark products would form an important branch in such an undertaking. It is true that the attempts hitherto made at forming a saleable tanning extract have not been



Jarrah (*E. marginata*).

successful, but it must be remembered that our technical and scientific knowledge on this subject has been vastly increased by quite recent research. The great desideratum in a tannin is one that will act within reasonable time and give a light colour to the leather; but until quite recently all our eucalyptus tannins were very slow-acting and imparted to the leather an undesirable red colour. The success of the application of the Mallet bark to this purpose has been the cause of considerable investigation of the various problems encountered, so that to-day in the case of the Gimletwood bark it may be definitely stated that a suitable tanning extract, one acting within reasonable time and of light colour, has been produced under conditions that point to its commercial success. Such a tannin extract has been manufactured lately within this State.

It may be urged that the demand for eucalyptus oil is not sufficient to warrant the undertaking of its production on a large scale. If the cost of production was materially reduced it seems reasonable to expect that an extended market would follow. At the present time the Commonwealth trade in this oil is about £60,000 yearly. The oil is sold at from 2s. 6d. to 20s. per lb.; the high price is confined to some of the oils in special demand for perfumery. The present demand is mostly for pharmaceutical purposes. It is to the extended use in the arts and manufactures that we must look for a broader market. In pharmacy itself an even broadening market might be reasonably anticipated, more especially if oils were produced of a definite composition, the constituents of which were expressed on the label of the package.

The imports into Western Australia during the last few years are as follows:—

1904—Imports £1,659, exports £28.

1905—Imports £1,442, exports £50.

1906—Imports £1,972, exports £36.

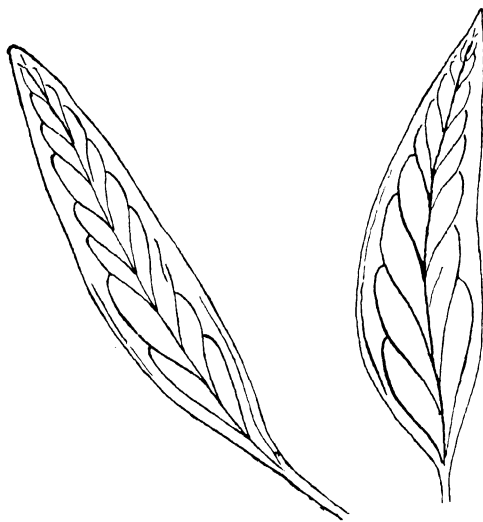
On the Eastern Goldfields we are cutting down about 500 acres per day of gum forests, and throughout the agricultural districts we are destroying at least this area daily. We are thus allowing to go to waste daily over 100 tons of oil alone. Certainly, the value of any part of this recovered and marketed would to a very great extent represent the labour of production; but this is also true to a very great extent of all farm production. In pharmacy the oil has no rival as a specific for ague. In fact, it may be accepted in the light of the experience of to-day that the cultivation of gum trees is the surest way of ultimately making healthy those countries afflicted with malaria, and that in time by the growth of gum forests this scourge may be banished.

Before the Christian Era the Romans drained the Campagna, and succeeding emperors enlarged the drained area, and, according to the lights of their days, attempted to make habitable the rich swamp lands; but right down to our own days malaria remorselessly claimed victims. Happily, one great worker in the field of botanical research, Baron von Mueller, suggested to a Roman Church dignitary the introduction of the eucalypt, which is gradually proving itself a "tree of life" to that old country. It is to be remarked here that malaria is not unknown in Australia, but round the Northern country where it occurs the eucalyptus is sparsely established, for most species of forest plants there are closely allied to those of the Indian jungle. As an

antiseptic the oil is without rival, being superior in this respect to carbolic acid. In the arts the oil is the best known solvent for amber and fossil gums, which gives it a value in the manufacture of high-grade varnishes. India-rubber is also soluble in the oil, and its application in manufactures is being daily extended. As an illuminant the only thing against it is its cost. It can be burnt in ordinary lamps and has a greater illuminating power than kerosene, and it is not liable to explosion.

It looks as if there is room for an extended market. The Salmon Gum, York Gum, Mallee, Flooded, and White Gums closely approach the Gimletwood for oil production. Except in that species of Mallee known as Mallet, little attention has been given to the bark of these species, which is a matter for regret, seeing that the discovery of the suitability of the Mallet bark for tanning purposes was the means of starting a considerable industry of special value to the settlers in its neighbourhood. Recent chemical investigation has revealed such values in the bark of the Gimletwood that the bark of closely-allied species is worthy of investigation. We might well wish that we had at our disposal some scientific institute where, with sufficient leisure and special knowledge, this most interesting subject might receive the attention it merits. The whole examination of the kinos of these species is of great scientific interest, and of considerable commercial importance. We have already noted that though eucalyptus oils vary in composition the product of any given species is constant, which should be borne in mind by manufacturers when any particular kind of oil is sought for. The same consideration may be said to apply to the kinos. Just as the genus has evolved in new species certain leaf features contemporaneously with the predominant appearance of certain constituents in the oil, so the different species, if examined in regard to the chemical analysis of the kinos, will exhibit the same constancy. From this it can at once be inferred that there will always be a direct relation in any given species between the oil constituents of the leaves and the tannin characteristics of the bark, which is also indicated by the structure of the leaf venation. This fact is of commercial importance. Many of the gums exude considerable quantities of kino. The most common example in this State is the Red Gum (*E. calophylla*). Space prevents us from dwelling long on this interesting subject, but it may be generally affirmed that the kinos possess much in common. In the older species of the genus a large quantity of tannic acid is present, but it is not commercially suitable as such tannins are very slow to act on hide and produce a dark, red-coloured leather. Their possibilities in this direction, however, call for further investigation, for if the whole of the tannin could be made commercially available, the extraction of the kino from the bark and wood, and the production of a tanning extract in a dry form has great market possibilities. Coming to the species we are particularly considering now, we find that, contemporaneous with the appearance of eucalyptol as the prominent constituents in oils, endesmin appears in the kinos, and though varying in amount with different varieties is constant for any one species. Experience has shown that it is only the endesmin-bearing kinos that are commercially valuable for tanning purposes. It is apparently due to the presence of endesmin that the tannin of the Mallet bark is of commercial importance, and the popular demand that has set in for this bark reveals how world-wide is the market for similar products. Recent chemical analyses show that the bark of the Gimletwood is comparatively rich in endesmin, and richer than the Mallet bark itself in tannin; as before-mentioned, containing

Mountain Ash, or Blackbutt, of N. S. Wales and
Victoria.



E. amygdalina. *E. regans.*

as much as 18.6 per cent. of tannic acid. Experiments have further demonstrated that by leaching this bark an excellent tanning extract can be produced, which can be evaporated to dryness without material decomposition, and the dry extract thus produced is stable. This tannin is light in colour, astringent, and acts on hide in a similar way to Mallet bark. This should constitute a commercial product of importance. In the leached residue of the bark there is still another body, *oxalate of lime*, which may be of commercial importance. Its presence ranging in the Mallee group from 5 per cent. up to 16 per cent. is of sufficient interest to call for notice. Microscopic examination of the dried bark also reveals this product in small crystals closely resembling the form of the mineral known as *whewellite*. The species we are now particularly discussing, Gimletwood, Salmon Gum, and Morrell, may be all classed in the Mallee group for this purpose, for their leaf and bark products are closely allied.

The faculty of absorbing and fixing in the bark such large quantities of *oxalate of lime*, and the presence of *oxalic acid* with those tannins that are of commercial importance is peculiar to the Mallee group. It is perhaps due to the excessive development of this faculty that some species of Mallee are of stunted growth, with a large basal development supporting several stunted branches, for the excess of *oxalate of lime* deposited in the bark may have the effect of choking the plant. Such an over-developed faculty may conceivably result in the extinction of a whole species.

The vast area of our whole continent, over which the Eucalyptus is distributed, together with the great number of its species transmitting their own characteristics to their descendants, mark this genus as one of great antiquity. Some of our greatest giant trees belong to comparatively recent species, but these youngest species have been established long enough to acquire a distribution over vast areas. Some of the individuals must also live to a great age. Many years ago, according as man—obsessed with his finite limitations—reckons time, a great law-giver exhorted of the people when besieging a city: "Thou shalt not destroy the trees thereof by forcing an axe against them, for thou mayest eat of them; and thou shalt not cut them down, for the tree of the field is man's life."

It is possible that some of our old gum trees, whose friendly shade delights us to-day, were then living.

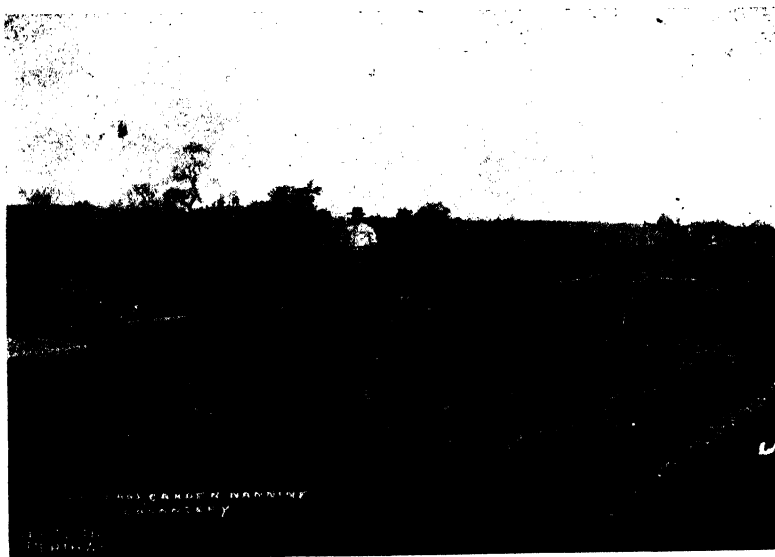
We may look away back through the ages that man himself has occupied the earth, back past the monuments he has left as time marks on his way, the Pyramids, the Sphinx, and those ruins away in Central Asia that mark his early civilizations; past these away back beyond the time when the cave-dweller fashioned rude implements of stone, and still further back recent species of the great Eucalypt Family had already covered vast tracts of the Continent. Eminently health-giving to its surroundings, it bids fair in the future to occupy a prominent place amongst all nations, when the necessity and beauty of forest culture shall be recognised. To-day the Australian abroad is gladdened on meeting in strange lands this "tree of life," whose honey-bearing blossoms and sweet leaf scents recall for a few happy moments the best memories of his native land.

SANDY SOILS.

PHYSICAL PROPERTIES.

Sandy soils allow the rain to percolate readily through them. In some respects this is of considerable advantage, for they may be tilled early in the spring, when the heavier soils are still too wet for cultivation. Thanks to this fact, they are also earlier than the heavier soils. The warm spring rains make their way readily into them and drive out the frost; there is less cold water in them, and they require less sunshine to bring up their temperature to the desired point. In a word, then, they are warmer because they are drier. On the other hand, the readiness with which they part with their moisture adds much difficulty to their profitable cultivation. Insufficient rainfall will injuriously affect their crops when those on the heavier soils are still flourishing. The differences are rendered still more striking on account of the limited power of coarse-grained soils to pull up the moisture by capillary action from the subsoil. The losses due to evaporation at the surface are not made good rapidly enough in such soils, and the deficiency of water becomes more pronounced. Hence the improvement of sandy soils calls for such methods of treatment as will increase their power of holding moisture.

Apart from their relation to moisture, and to heat as affected by varying quantities of moisture, sandy soils also differ markedly from heavier, fine-grained soils in their relation to air. Because of their open character the air circulates rather freely in them and penetrates to greater depths. This in turn facilitates more intense chemical and bacteriological changes. Injurious compounds derived from preceding crops are destroyed more rapidly, the plant-food locked up in the humus is rendered available more quickly, and the rock particles are made to weather more effectively. Yet the ready penetration of air into the soil is, beyond a certain point, decidedly undesirable. With too much air and an abundance of moisture the decay and weathering processes go on too rapidly, the humus burns out too quickly, and the losses of plant-food are too great. It is evident, therefore, that sandy soils have their advantages and disadvantages in relation to air, as well as in relation to moisture. It should be the aim of the farmer to discourage the too thorough aeration of his sandy soils, either by methods of tillage, as, for instance, rolling, or by additions of fine-grained materials or of substances capable of breaking down into minute particles. The practice of marling, once so prevalent in New Jersey, partly owed its effectiveness to this very addition to open soils of large amounts of finely-divided material. Similarly the addition of large quantities of humus-forming materials, as is done in systems of green manuring, provides for the closing up of a portion of the air space in soils and thus helps to prevent a too rapid entrance of the outside air. The effectiveness of humus in this connection is still further increased by its great affinity for moisture, since the water which is retained in the soil crowds out an equivalent volume of air.



Citrus Fruit Culture, Murchison District.
Messrs. Jose Bros.' Orango Orchard, Nannine.

CHEMICAL PROPERTIES.

The sandy soils of South Jersey are for the most part poor in plant-food. In extreme cases these soils are mere heaps of quartz fragments. A striking illustration of this may be found in the soils of the east and west plains situated in Burlington and Ocean counties, and comprising a total area of more than 14,000 acres. Some of the samples taken from the plains were found to contain as much as 98 per cent. of pure quartz, and in some instances even more. Lime was found in very small amounts, magnesia and potash in traces only. The proportion of organic matter was quite slight, in a portion of the samples less than 1 per cent. There are many thousands of acres in South Jersey which, if not as poor as those of the plains, are scarcely much better. The frequent fires which have swept through the forests of the region within the last one hundred years have helped to increase the poverty of these soils. The scanty store of humus has been burned out time and again, the plant-food of the humus has been leached out to a great extent and the residual mass of white sand lies bleaching in the sun, dry and lifeless. Another portion of the sandy soils in South Jersey is fairly well provided with plant-food, yet even these are much poorer in nitrogen, phosphoric acid, potash and lime than are the heavier soils. The only exceptions to be noted here are the soils on the marl areas, and likewise those which have long been subjected to intensive methods of cultivation.

It does not follow, however, that the sandy soils, even those which are quite poor in plant-food, are not susceptible of improvement. The phosphoric acid and potash in which they are deficient may be supplied at a comparatively small cost, while the nitrogen and the humus may be furnished either in animal manures or in green manures. The market gardeners in South Jersey have long ago learned the value of organic materials for improving the productive capacity of their soils, and the enormous quantities of horse manure purchased by them in the large cities bear ample testimony to the great need of humus and of humus-forming substances in the open, sandy soils. Without a sufficient amount of humus these soils cannot hold enough water to supply the requirements of large crops; without a sufficient amount of humus these soils do not provide a gradual and abundant supply of nitrogen compounds to the growing crops; without a sufficient amount of humus they do not satisfactorily retain the mineral fertilizers applied to them, nor do they permit the intense chemical changes which are necessary for the proper production of available plant-food.

Effective as are applications of horse manure in supplying humus to open, sandy soils, they are not indispensable. Indeed, the use of horse manure for this purpose is not always practicable or desirable. In the first place, horse manure is too expensive for general farm crops; in the second place, it adds much to the work of the farmer, especially where the railroad is located at some distance from his fields; in the third place, horse manure has been known to introduce undesirable weeds and to encourage the spread of certain fungous diseases.

Systems of green manuring as a means of soil improvement have been found particularly effective on light soils. This is accounted for by the relatively greater need of nitrogen and of humus in these soils, and likewise by their more pronounced power to digest the plant remains and to convert them into available plant-food. This more pronounced power is due to the peculiar physical character of sandy soils as affecting the circulation of air in them.

It must be remembered that the decomposition of vegetable or animal substances in the soil is very similar to slow burning. As we shall presently see, this burning is brought about by bacteria, yet the essential fact remains that just as all combustible materials burn the more fiercely the more rapidly the air is supplied to them, so in the soil the humus burns out the more rapidly, the better the supply of air. Indeed, in very open soils, applications of organic matter disappear so rapidly as to make it practically impossible to increase the humus content of the land. For this very reason difficulty is often experienced in establishing lawns on sandy soils, and where they are very open annual applications of even as much as twenty or twenty-five tons of manure per acre seem to leave no lasting effect. We are taught thus that not alone the humus disappears quickly from sandy soils, but also the nitrogen, since it is the humus rather than any other constituent of the soils that contains the soil nitrogen. Hence in systems of green manuring for sandy soils it should be our aim to plough under, at frequent intervals, crops which contain in them large quantities of humus-forming material. Preference should be given, of course, to leguminous crops, like crimson clover, cow peas, soy beans, vetch, etc., for these add to the soil not only humus, but also nitrogen.

We shall note, however, that green manuring has its limitations. To be wholly satisfactory, green manuring requires the presence of an abundant supply of phosphoric acid, potash and lime in the soil. It requires likewise an abundant supply of moisture, since without the latter profitable returns cannot be expected. It should be remembered that the soil is drier after a green manure crop than it would be had it been kept fallow. The green manure crop takes considerable quantities of moisture out of the soil and reduces thereby the supply for the following crop. Moreover, the drying effect of the green manure may be so pronounced as to interfere with its proper decomposition after it is ploughed under. There are numerous instances on record where heavy crops of rye or of crimson clover ploughed under as green manures reduced materially the yields of the following crops. This they did not alone by using up much soil water during their period of growth, but also by opening up the soil when their bulk was added to it. They destroyed the connection between a portion of the surface soil and the subsoil, and facilitated the drying out of the former. As might be expected, the germination of seed in such dry material is very unsatisfactory, and the growth of the young plants but feeble. It will be seen, thus, that green manures should not be allowed to become too coarse and bulky before they are ploughed under, especially in soils that are apt to suffer for lack of moisture. The difficulty may be overcome partly by the use of heavy rollers, yet there is always the possible danger of excessive drying of the soil. In countries where the annual rainfall does not exceed twenty-five to thirty inches the value of green manuring systems is often much impaired on this account. In South Jersey, where the annual rainfall is between forty-five and fifty inches, the disadvantages of green manuring are, from this standpoint, comparatively slight.

BACTERIOLOGICAL PROPERTIES.

Bacteria are minute living beings invisible to the naked eye. They are so small as to require a magnification of 500 to 1,000 times before they become discernible under the microscope. On the average, it will take 25,000 bacteria, placed end to end, to make up one linear inch. Bacteria of various kinds are

present in all soils, ranging from less than 28,000,000 per ounce of soil to ten, fifty, or even a hundred times that number. In extremely fertile garden soils, or in sewage-contaminated earth, their numbers may increase to many billions per ounce. Because of their enormous numbers the bacteria in the soil are enabled to accomplish a great work. It is reserved for them to decompose the soil humus and to render available the plant-food contained in it. To them also is reserved the important task of transforming the nitrogen gas in the air, as such unavailable to crops, into compounds of nitrogen which may serve as a source of food to cultivated plants. Without bacteria in the soil the humus would not decay, and, accumulating in large amounts, would soon render the land unfit for the habitation of plants. But even if the decay of humus could still occur, without bacteria the plants would soon starve for lack of nitrogen, ordinarily provided by certain kinds of bacteria. The bacteria in the soil must thus be regarded as the indispensable scavengers that destroy the dead tissues of former plants and animals in order that new plants and animals might be born and develop, and likewise as busy builders of nitrogenous materials out of the nitrogen gas in the air.

The different chemical changes produced by soil bacteria are quite numerous. Some kinds are specialised for one series of changes, others for changes of a different sort. Some will attack by preference carbohydrates like starch or sugar, some will decompose woody tissue, some will cause the decay of proteins, some of fats, etc. This division of labour allows an effective decomposition of humus. Various gases and acids are produced in the course of decay and help to decompose the rock particles in the soil and to render the mineral plant-food contained in them available. The insoluble protein compounds in the roots and stubble are broken down and their nitrogen changed partly to ammonia. The particles of ammonia, as they are thus generated by bacteria of many kinds, are at once pounced upon by a special class of germs whose function it is to change the ammonia into nitrate. Thanks, therefore, to the activities of many species of bacteria, the nitrogen locked up in the humus and in manure or green manure is transformed gradually into nitrate, and is then quite suitable for the building of roots, stems, leaves and fruit.

The activities of the germs in the soil are directly influenced by the supply of air, moisture and warmth, as well as by the chemical composition of the soil itself. In sandy soils the air circulates freely, hence the kinds of germs which need large quantities of air for their growth become prominent in them. The abundant supply of air encourages their rapid growth, and they cause intense decomposition of the humus. Among these air-loving species of bacteria there are some which cause so rapid a burning up of the humus as to compel the nitrogen to return to the atmosphere as nitrogen gas. Hence, where the soils are too open, the rapid decomposition of humus may involve very serious losses of nitrogen. It is not desirable, therefore, to till these soils too much lest the constant stirring of the particles intensify the aeration and increase the already large losses of humus. In compact, fine-grained soils, on the other hand, the more thorough stirring of the soil particles is eminently desirable, since without such tillage the decomposition of the humus is not rapid enough to yield the best results.

In relation to moisture also, sandy soils possess distinct bacteriological peculiarities. Bacteria stop multiplying as soon as the moisture content of the soil falls below a certain point. Now, since sandy soils are prone to dry out rapidly, their bacteria are frequently checked in their development. We

note, therefore, a marked difference between sandy soils and sandy loams on the one hand, and clay soils and clay loams on the other. Under favourable conditions of moisture and temperature the multiplication of bacteria in light soils is more rapid than that in heavy soils. In the latter, however, the changes in numbers are not so sudden, for the supply of moisture is more uniform here. In sandy soils the decomposition of humus has its period of great intensity followed by intervals when the bacterial activities are more or less markedly retarded. In the heavier soils the bacterial activities are neither as intense at some periods, nor as sluggish at others. This circumstance would naturally lead to the conclusion that the supply of plant-food, and especially of nitrogen, is more uniform in heavy soils than it is in light soils. It follows, further, that by increasing the amount of humus in sandy soils we increase its water-holding power and assure thereby a more uniform bacterial development and a more uniform supply of available plant-food. By increasing the amount of humus in sandy soils we assure likewise a less thorough aeration and check somewhat the rapid destruction of the organic matter. Briefly stated, then, the increase of humus in sandy soils encourages the growth of bacteria, thanks to the greater content of organic matter and of moisture, and discourages it, thanks to the less thorough aeration. In a practical way we at times utilise this intimate relation between the moisture content and bacterial development in sandy soils. Fruit growers have learned to know that by planting green-manuring crops in their orchards they can sufficiently reduce the moisture content of the soil to check markedly its bacterial activities. This is often of advantage in fruit growing, for there is a tendency on the part of fruit trees to grow too late in the season and to retard thereby the maturation of the fruit. Moreover, much of the young wood formed in the latter part of the season is liable to be winter-killed. Now, the green-manuring crop reduces the proportion of water in the soils, retards the growth of the bacteria, checks the accumulation of nitrates, and eliminates the foreing effect of the latter on the fruit trees.

Apart from the various kinds of soil bacteria just considered, which gradually decompose the humus and change the insoluble protein nitrogen into nitrate, there are other germs in the soils upon which the value of green manures largely depends. These germs are designated as *nitrogen-fixing* or *nitrogen-gathering* bacteria. It has been definitely established that although the atmosphere surrounding the earth is for the most part composed of nitrogen, and that there are about 35,000 tons of this gas over every acre of land, the plants growing in the field have not the power to make use of it. We frequently see thus acres and acres of yellow, stunted plants actually starving for want of nitrogen, while immersed in an aerial ocean whose bulk is nearly four-fifths nitrogen. Under certain circumstances, however, this nitrogen becomes available to field crops. It is known that some plants, nearly all belonging to the legume family, can make use of this nitrogen provided they have the help of the nitrogen-fixing bacteria just referred to. These organisms make their way into the roots of the legumes and cause the formation of swellings known as nodules or tubercles. The nodules are filled with millions of bacteria which secure their food from the sugar and other compounds present in the plant juices. With the aid of such compounds they manufacture nitrogenous substances out of atmospheric nitrogen, and the host plant profits by this process in that it takes away a portion of these nitrogenous substances and utilises them for the building of roots, leaves and stems. It seems, there-



Tomato Cultivation. Messrs. Jose Bros., Naimine.

fore, that the partnership is profitable to both the plant and the bacteria, the former securing, thanks to it, an abundant supply of nitrogen compounds; the latter securing the sugar and mineral salts necessary for their rapid growth.

The amounts of nitrogen secured from the air by leguminous crops with the aid of bacteria are quite variable. For instance, two crops of clover, one from a fertile loam, the other from a light, sandy soil, may be found on analysis to contain exactly the same quantities of nitrogen, let us say 150 pounds per acre. Now, the question is, what proportion of this nitrogen was derived from the air and what proportion from the soil itself? An exact answer to this question is difficult, if not impossible, and for the following reasons: It seems that the plant does not at first welcome the bacteria. It makes an attempt to keep them out, and is successful according to the degree of resistance which it possesses. The conditions are somewhat similar here to the entrance and development of disease germs in the animal body. Some animals are said to be susceptible and easily fall a prey to that particular disease; others are resistant and kill off the germs which gain entrance into their bodies. In such cases the disease can make no headway.

Similarly, in the case of leguminous plants, the nodule bacteria are kept out by resistant individuals. It is only when the resistance is markedly reduced by unfavourable conditions of growth that the bacteria enter readily and cause the formation of the characteristic nodules. Lack of available nitrogen is the determining factor among these conditions, for legumes require much larger quantities of nitrogen for the building of their tissues than do plants of other families. It happens, therefore, that even in soils fairly well provided with available nitrogen the legumes do not readily find an abundant supply of it to keep them in a state of vigour. Their powers of resistance are decreased as the supply of available nitrogen becomes inadequate, and they can no longer keep out the bacteria. In extremely fertile soils naturally provided with a great abundance of nitrates, or in soils where large quantities of nitrate of soda are applied, the legumes succeed in keeping out the nodule bacteria entirely. No nodules are then formed on their roots, and all of the nitrogen contained in their tissues is derived from the soil. Under such conditions they do not differ from wheat, corn or potatoes, except that they constitute a more severe drain on the store of soil nitrogen.

Soils of such extreme richness, in so far as the nitrogen is concerned, are not common. It is only in market gardening, where enormous quantities of manure and fertilizer are used, that nodule formation is effectively prevented. In most soils the legume bacteria are more or less prominent, and it may be stated, generally, that a portion of the nitrogen contained in the leguminous crops is derived from the air. As to the extent of this portion, the composition of the soil itself must determine the final result, as was made evident by the foregoing remarks. It is quite true that the greater the amount of available nitrogen in the soil the smaller the amount taken by the leguminous crop from the air, and *vice versa*. Hence it is evident that a clover crop containing 150 pounds of nitrogen may have secured all but ten or fifteen pounds of it from the air, or it may have secured only ten or fifteen pounds from the air and the rest from the soil itself.

Turning now to the growth of leguminous crops in sandy soils we observe that the conditions there are extremely favourable for the fixation of large amounts of atmospheric nitrogen. Thanks to the open character of these soils and the facility with which the air circulates in them, the formation of nodules

on the roots is favoured. This will be readily understood if we remember that the nodule bacteria take out considerable quantities of nitrogen and of oxygen from the air surrounding the nodules. In sandy soils this air is renewed frequently enough to create the best conditions for the growth of the organisms within the nodules. In fine-grained, compact soils the air is not renewed as frequently, and is liable to be crowded out entirely by an excess of moisture, thus leaving the nodules immersed in water instead of air. This circumstance also explains the fact that in compact, fine-grained soils the nodules on the roots are all near the surface, whereas in sandy soils they are distributed to greater depths.

Another factor which strongly favours the fixation of atmospheric nitrogen in sandy soils is the comparatively small proportion of available nitrogen present in them. As has been demonstrated in numerous experiments, the young plants grow normally at first, but as the supply of available nitrogen becomes reduced they turn yellow and make scarcely any progress for a time. This is known as the *hunger* period. In this feeble state they cannot keep out the bacteria which enter, cause the formation of nodules, and rapidly multiply within them. But as they fix the nitrogen from the air, the host plant takes it away from them, and being properly supplied, soon assumes the dark green colour and makes rapid progress after that. Now, it is well known that in sandy soils the hunger period arrives sooner than it does in the heavier soils. The accumulation of nitrogen begins, therefore, at an earlier period, and the gains to the soil and its owners are proportionately much larger.

There is still another factor which is of the utmost importance in the accumulation of nitrogen compounds in the soil. Bacteriologists have discovered that germs of the same kind differ not only as to the rate of their multiplication, but also as to their power of accomplishing chemical change in a given length of time. In the case of the nodule bacteria it has been found that vigorous strains may be able to fix many times as much nitrogen as will be fixed by feeble strains of the same species. This fact has a direct bearing on the growth of leguminous crops and their value as soil renovators. A soil in which conditions are not favourable for the survival and the development of the nodule bacteria will in time contain only feeble strains. In extreme cases the organisms will die out entirely, as frequently happens in very sour soils, or in soils deficient in humus and in mineral plant-food. On the other hand, in soils where conditions are favourable for the survival and the development of the bacteria, the latter will retain their full vigour, or will even increase it. From this standpoint sandy soils, well provided with moisture and with plant-food, are favourable for the nodule bacteria, and with careful and intelligent methods of cultivation the largest yields of nitrogen compounds may be secured in them. This fact is particularly significant since the leguminous plants cannot keep out the vigorous bacteria as readily as they can keep out the feeble bacteria. Hence in productive soils, properly managed, the inoculation of the plants will occur sooner than it would in soils that are improperly managed. Sandy soils are thus particularly adapted for systems of green manuring, for they favour the early inoculation of their leguminous crops with vigorous strains of nodule bacteria.

It happens at times that the proper bacteria are not present in the soil. Certain legumes new to a particular region fail to develop nodules on account of the absence of the proper organisms. On the sandy soils in South Jersey the leguminous crops that may fail to develop nodules when first introduced

are soy beans, alfalfa and vetch. In the experiments at Hammonton the soy beans grown on one of the plots during the first season failed to develop nodules. They remained yellow and small and were evidently suffering for lack of nitrogen. A crop of cow peas on an adjoining plot grew vigorously and was of a dark green colour. The soy beans had no nodules on their roots, while the cow peas were abundantly provided with them, showing, in the first place, that the bacteria producing nodules in the two crops are not the same; and in the second place, that the soy bean germs are not naturally present in the sandy soils of South Jersey. Subsequently some earth was obtained from a field where vigorous crops of soy beans had been raised and applied to the Hammonton soils. After that the soy beans have, as a rule, given very satisfactory returns. We are taught thus that the nodule bacteria are indispensable for the welfare of leguminous crops on sandy soils, and for that matter on all soils, and that when they are naturally absent they may be supplied from outside sources.

The introduction of nodule bacteria from outside sources is known as soil inoculation. Soils may be inoculated either by means of earth from some field known to contain the proper organisms, or by means of *cultures*. Where earth is used the process is quite simple. It consists of the broadcasting of several hundred pounds of earth per acre, and its incorporation with the soil by means of a harrow. Where cultures are used the process is somewhat different. A culture, as bacteriologists understand the term, is a growth of bacteria on some substance suitable for their development. Liquid cultures are growths of bacteria in solutions containing usually sugar and mineral salts. Solid cultures are growths of bacteria on solid substances like slices of potato, gelatin, agar, etc. Again, cultures may be mixed, that is, containing two or more different kinds of bacteria, or they may be pure, that is, containing only one kind.

In so far as the nodule bacteria are concerned cultures have been placed on the market and have been employed with varying success. In most instances the cultures failed to yield satisfactory results. Twelve or thirteen years ago cultures of nodule bacteria on gelatin were sold in Germany under the name of Nitragin. These cultures gave negative results in most cases largely because gelatin is not a suitable material for the growth of nodule bacteria. It is too rich in nitrogen and the bacteria growing on it deteriorate and lose their power of fixing nitrogen. Several years ago an attempt was made by the Department of Agriculture, in Washington, to improve on the German method by drying the nodule bacteria on strips of absorbent cotton, and using the latter as material for the preparation of liquid cultures. Such inoculated strips of cotton were sent out accompanied by packages of mineral salts and sugar which were to be dissolved in water. The cotton was to be placed in this solution, and the bacteria on the cotton thus given an opportunity to multiply to enormous numbers. After that it was merely necessary to moisten the seed with the liquid cultures thus produced. Hundreds of thousands of bacteria remained adhering to the outside of each seed, and when the latter were placed in the soil the organisms were there to enter the rootlets of the young legumes. The publication of the method created much comment, and exaggerated statements concerning its value were circulated in various newspapers and magazines. An attempt was also made to prepare such cultures on a commercial scale and they were sold under the name of Nitro-Cultures. Subsequent experience showed, however, that the cotton cultures

were decidedly unsatisfactory and inefficient, largely on account of the fact that the nodule bacteria are for the most part destroyed by drying. More recently the methods of inoculation with pure cultures have been improved both in Europe and in America, and when properly used have given some very gratifying returns.

There is good reason for the belief that soil inoculation by means of pure cultures will be made still more certain and effective in the future. Theoretically, it should become possible to secure positive results from inoculation, not only on soils lacking the proper bacteria, but also on those containing large numbers of them. This may become possible when the pure cultures will be made to furnish organisms of a greater degree of vigour than that possessed by the bacteria already in the soil. Such more vigorous bacteria will assure a more rapid and more thorough inoculation, and, thanks to their greater nitrogen-fixing power, will allow the plants to accumulate greater amounts of nitrogen in a given time. That this is not mere speculation is proved by a considerable amount of experimental evidence. It has been found that in the growing of crimson clover on sandy soils the amounts of nitrogen gathered by the crop were quite variable under different conditions. In some instances equal weights of crimson clover from different fields contained markedly different amounts of nitrogen. On some soils the accumulation of a given amount of nitrogen was accomplished in a much shorter time than on other soils. The differences were particularly striking between soils where crimson clover had been grown recently and those where this crop had not been grown for some time. This would show that by frequently growing a leguminous crop on a suitable soil the proper bacteria are not only increased in numbers, but also in efficiency. Similar observations have been made, also, in the case of cow peas and soy beans. It has been noted that a crop of cow peas raised on land where they had not been grown for several years usually contains fewer tubercles on its roots and accumulates less nitrogen from the air than a crop of cow peas grown on the same land in the following year. It need scarcely be pointed out here that this fact is of great importance in the utilisation of leguminous crops as green manures. The value of any crop for green manuring purposes depends partly upon the rapidity of growth. Frequently the growing period is short, the land must be ploughed for the main crop, and if the green manuring crop had not managed meanwhile to accumulate enough humus and nitrogen to repay the farmer for his labour, its value is but slight. It goes without saying, therefore, that any methods of soil inoculation, fertilisation or tillage which will allow a gain of ten days or two weeks in the accumulation of a certain amount of nitrogen, will be a valuable contribution to our resources in building up and maintaining the fertility of sandy soils.

CORRESPONDENCE.

PRICKLY COMFREY (*Symphytum asperinum*).

Mr. C. A. Mouchy, of Preatorin, Balbarrup, writes:—"I should like to know whether a fodder plant, botanically known as *Symphytum asperinum*, is in this country. If so, where I could buy some seed? This fodder has given splendid results in Italy, France, and England, and in this climate (Warren district) it could be favourably grown. If the seed is not procurable here I intend sending for some abroad."

The Department is not aware whether anyone in this State has attempted the cultivation of the fodder plant referred to, and none of the local seedsmen appear to stock it.

The plant is commonly known as "Prickly Comfrey." It is very hardy and yields a large bulk of foliage. The roots are strong and fleshy—similar to the dock, and penetrate to a great depth, which sustains its vigour during the year. Propagation is easy from root cuttings, but rather difficult from seed. It prefers moist or even boggy land. The plant grows to a height of about three feet, and has large, long leaves, which are mucilaginous in character. It yields from 10 to 15 tons of green fodder per acre. One of the two chief objections to this plant is the difficulty in getting stock to take to it; this they do, however, after a time. In composition "Prickly Comfrey" compares with some other succulent crops, but has nothing special to recommend it. It is no use for hay. The analysis shows:—

Water	..	..	..	..	88.4
Ash	..	..	..	..	2.2
Protein	..	..	..	..	2.4
Fibre	..	..	..	..	1.6
Nitrogen, free extract	..	..	..	..	5.1
Fat	..	..	..	..	.3

Seed could probably be obtained from Messrs. Sutton & Son, Reading, England.

POULTRY NOTES.

By FRANK H. ROBERTSON.

THE BEST TIME TO HATCH.

The present month (October) is a busy time for the poultry-keeper, as it is the middle of the breeding season. There are some persons who raise chickens all the year round, with the idea that by so doing they will thus get birds to lay at all seasons. This sounds very well in theory, but does not work out well in practice, because chickens which are hatched late, that is during the months of December, January, and February, do not grow nearly so quickly as those hatched early. For instance, suppose one lot of chickens are hatched in September or October; the weather is nice and bright; there is plenty of greenstuff about, and a good supply of insect life. The stock birds

are in full lay, and are bright and healthy looking, resulting in fertile eggs possessing strong germs. It is the spring of the year, and the natural building season, the young chickens are consequently strong and vigorous right from the start; they break through the shell quickly, and are soon running about, and unless badly treated are hard to kill. They get a good start at the best time of the year, and in five or six months' time commence laying; that is in April, May, and June, when eggs are dearest, in fact, it is from these spring hatched chickens that the bulk of our autumn supply of eggs is obtained. Just at that time most of the adult hens are moulting, those which give us eggs are either ones which get through the moult early and quickly, or ones which are late in moulting, but are persistent layers, and even lay when casting their feathers. Now, take another lot of chickens which are not hatched until December or January. They are from stock birds which have gone through the heavy laying season, their vitality is not as great as it was in the spring; they are looking duller in plumage and have not such red combs as they had, in fact, they are past their prime; their progeny are, consequently, not so vigorous, and moreover the hot weather comes on before they are half grown and keeps them in that state for weeks at a stretch, eventually they only come into laying during the following spring when eggs are plentiful. They never attain the size of the early hatched chickens, and they are always more susceptible to disease; also if breeding for show purposes late-hatched chickens are subject to faults in plumage, particularly in such breeds as Minorcas and Brown Leghorns, white or mealy flights being of frequent occurrence. Then again, follow the life history of chickens hatched in April and May. They are the progeny of birds which are either through the moult, or from ones which have not yet moulted; the chickens have good vitality and meet the cooler season; they thrive well and develop quickly, but come on to lay about November when eggs are cheap, but, unfortunately, they do not keep up the egg yield during the autumn, but follow the example of adult birds and go into the moult, therefore they are not so profitable, from an egg point of view, as the spring-hatched chicken. This fault is, however, counter-balanced to a great extent by the cockerels, as during the months of September, October, and November prime cockerels are very scarce and fetch splendid prices. If only on this account, it is desirable that autumn hatching should receive more attention from poultry keepers than is customary at present. It is not possible to hatch a large number of chickens in April or May, owing to the scarcity of broody hens at that time of the year, besides it is expensive owing to the high value of eggs for table purposes. It is, however, bad policy to waste broody hens then.

There is another matter to be remembered when considering the best dates for hatching, and that is, that it varies very much in different parts of the State owing to the great diversity of climatic conditions; thus comparing Kalgoorlie and Bridgetown or Narrogin, hatching operations will have been finished on the Goldfields when they are in full swing in the cool districts. Briefly summing up the question, without specifying dates or localities, the best time of the year for hatching in the largest numbers is in the spring, but if a larger number of chickens is wanted a start can, of course, be made earlier, gradually increasing the number as the bright weather advances, and correspondingly diminishing as the hot weather comes on, and entirely suspending operations during the hot summer weather. From that on moderate hatching can be carried on right through the winter if circumstances permit

and numbers are required. Working on these lines will be found much more satisfactory and profitable than the oft-recommended system of hatching all the year round.

CHICKEN FEEDING.

Many people who succeed in hatching a nice lot of chickens have great difficulty in rearing them, no matter how much they try, and what expense they go to in getting the best foods. Attention is paid to grit, greenstuffs, and clean water; and all precautions are taken to guard against lice and tick, and yet the little chicks go off one by one. The first symptoms are drooping wings, which fall lower and lower; the little things look miserable, and one or two are found dead every morning. In nine cases out of ten the cause of failure is not on account of unsuitable food but the manner in which it is given, and the nature of the soil on which the chickens are running. To get good results, the soil must be perfectly fresh and clean, and be a spot on which fowls have not already been running over. This is impossible to obtain in small back yards, therefore chicken rearing should not be attempted in such places; but given a garden, paddock or waste land to which fowls have not already had access, chicken rearing is a simple matter. Even then care must be taken to see that the chicks are removed to fresh ground every day, because it is remarkable how quickly the soil is poisoned. The food is, as a rule, eaten on the ground, and it is thus quite plain that unless the food is eaten off perfectly sweet soil that bowel trouble will surely occur. The secret of chicken rearing is sweet ground, and sweet food; the latter, to be wholesome, must be also fresh. Therefore, given clean ground, great care must be taken not to feed to such an extent that any remains lie about. If it does it is almost impossible to prevent it getting soiled, therefore feed sparingly, and only in such quantities as are eaten up quickly. So many people cannot resist feeding too freely. To learn to feed sparingly, not only to chickens, but also to fowls, is the hardest lesson the poultry-keeper has to learn.

THE TICK PEST.

Very little has been heard of the tick pest of late, but on the approach of the warm weather it will make its presence felt with the usual disastrous results; but if people only took a little common-sense precautions the pest can be easily fought and eradicated. But so many persons on finding that tick is in their fowlhouses, tinker with it, and put themselves to a lot of unnecessary trouble. They pull a few boards to pieces, and use sprays of various sorts, and hunt around at night-time with lantern or candle and kill all the insects they see, and think they get rid of the pest in this manner, only to find a few months later that they are as thick as ever.

As an instance of the difficulty of extermination, a little personal experience will be of interest to my readers. On finding tick in a fowlhouse, as many of the insects as possible were first killed by inserting a thin-bladed knife under all probable harbours; then kerosene was freely injected, but live insects were still to be found, so a fire was lit in the shed (which, I may state, was a supposed tick-proof fowlhouse of iron, with the wood outside), the structure was got almost red-hot, and, of course, a good deal damaged. One would think there could be nothing alive after that, but on examining the woodwork near the ground several lively ticks were found. The fire was again lighted, and allowed to completely demolish the structure. There were

other fowlhouses close by, but no tick could be found in them. To make sure, pieces of flannel were tied round all perches in each house, and an examination of the rags was made every day for the following ten days. About a dozen young ticks were trapped in this manner, and the pest was thus exterminated from the yard. No matter what steps are taken to get rid of the pest, traps are always necessary as a means of effectually eradicating it, and as it only means providing flannel bands tied round the perches anyone can readily adopt this precaution.

THE STANDARDS.

Among fanciers, the question of standards comes in for much discussion. It is generally admitted that Australia follows England in this respect, and sticks to the standards as published by the British Poultry Club; but America has also its recognised standards, which in many instances differ from the English, so that a man going to the expense of importing valuable show birds from the United States may find he has obtained birds which would not get a card in the show-pen here, particularly if any of the Mediterranean varieties were obtained. The Yankees appear to follow British ideas in such breeds as Dorkings, Game, Houdans, Runner Ducks, Cochins, and Orpingtons; but their Brahmas have much less fluff and foot feather. Yet, strange to say, the Americans appear to like even more cushion and foot feather in Cochins than the British. Another strange thing is the fact that English Wyandottes, so far as we can see by judging from the specimens which have of late been imported from England, are of bad type, being too leggy and shallow-breasted.

It is all very well for us Australians to say we follow the English standard, but when we buy British show birds we find that they are far from what they should be. The fact of the matter is that the British are the biggest sinners in not adhering to their own standards, particularly as to type. Then, again, look at the White Leghorns that have been imported from England as choice specimens. Why, they have little beyond the colour of their plumage to entitle them to the name of Leghorn—great, tall, leggy, cumbersome birds, with none of the bright, active style so characteristic of the true Leghorn. Then compare the American and English Plymouth Rocks. The former are undoubtedly a better bird in every respect, being handsomer, not so cumbersome, and much better layers. But the American Minorcas and Leghorns will never suit our ideas, particularly as regards head points. We like to see a decent-sized comb on a show bird, and the mean-looking combs on American Leghorns are never likely to become popular with fanciers in this part of the world. It would be a very fine thing if there could be standards for all breeds which would be alike all the world over, but, as such is never likely to occur, the best plan would be for not only Western Australia but all Australia to combine and have its own standards. We are, as it were, an unbiassed Commonwealth, and, as a matter of fact, our judges and fanciers do recognise certain types as the correct thing, in more than one variety, which would not be acceptable to either English or American ideas. Therefore, why not combine and put our ideas into printed form and have Australian standards? Our great aim should be to so frame them that fancy points could not be developed to such an extent as to interfere with the utility qualities of any variety. Australians could evolve standards which would combine the good qualities of both the two now recognised, and eliminate the undesirable points.

THIRD EGG-LAYING COMPETITION AT SUBIACO.

[Commenced July 1, 1908. To close March 31, 1909.]

Appended, herewith, are the results for the new competition which commenced on the 1st July and is to run for nine months, terminating on the 31st March, 1908.

Eggs for sitting from any of the pens are obtainable on application to the Manager at Subiaco; prices range from 10s. 6d. to 21s. per dozen. A price list is forwarded on application, or see the *Journal* for July.

The following are the results up to September 30 :—

The figures in black indicate the winner of the monthly prize.

The first column of figures indicates the present position of the pens in the competition.

Pens marked thus * remained in from last competition.

FOWLS.

Six pullets and one male bird in each pen.

Owner and Breed.	July.	Aug.	Sept.	Total
1 Mrs. A. S. Craig, Black Orpington	131	145	129	405
2 Mrs. L. Mellen, White Leghorn	106	126	133	365
3 J. W. Buttsworth, White Leghorn	113	133	117	363
4 Sunnyhurst (S.A.), White Leghorn	109	111	143	363
5 C. Herbert, White Leghorn	86	129	133	348
6 Mrs. C. F. Schmidt, White Leghorn	104	117	127	348
7 Gaffney & Bach, White Leghorn	102	117	128	347
8 Mrs. Kynaston, White Leghorn	91	130	122	343
9 A. M. Thomas, White Leghorn	77	133	132	342
10 Lionhurst Poultry Farm, Buff Leghorn	104	116	121	341
11 A. H. Padman (S.A.), White Leghorn	71	124	146	341
12 C. B. Bertelsmier (S.A.), White Leghorn	94	125	121	340
13 S. Craig, White Leghorn	81	126	133	340
14 Greenville Poultry Farm, White Leghorn	97	114	127	338
15 Glendonald Poultry Yard, Silver Wyandotte	92	117	129	338
16 T. W. Martin, White Leghorn	76	126	131	333
17 Mrs. A. E. Kinnear (S.A.), White Leghorn	82	110	136	328
18 E. Garbett, White Leghorn	71	129	120	320
19 Mrs. Hobley, White Leghorn	87	118	111	316
20 Bon Accord Poultry Yard, White Leghorn	94	119	102	315
21 Shamrock Poultry Farm, White Leghorn	82	99	133	314
22 Greenville Poultry Farm, Silver Wyandotte	105	97	107	309
23 J. Gaffney, White Leghorn	83	106	119	308
24 W. Elliot, White Leghorn	89	109	109	307
25 Homebush Farm, White Leghorn	80	107	118	305
26 T. Ockerby, White Leghorn	62	126	116	304
27 G. Bolger, White Leghorn	49	115	138	302
28 Paddy King & Salter, White Leghorn	95	101	105	301
29 Mrs. Flynn, White Leghorn	78	94	114	286
30 *T. W. Martin (late O. James), White Leghorn	62	104	114	280
31 Honner and Forbes, R.C. White Leghorn	69	99	111	279
32 Mrs. Hughes, White Leghorn	57	92	126	275
33 Coolgardie Poultry Farm, White Leghorn	66	97	110	273
34 J. R. De Morrison, White Leghorn	61	104	108	273
35 *J. Stuart, Golden Wyandotte	69	101	99	269
36 *White Wings P.F. (No. 2), White Leghorn	71	93	103	267
37 *Adelaide Poultry Yard, R.C. Brown Leghorn	62	99	106	267
38 Devine & Migro, White Leghorn	58	94	115	267
39 R. G. Flynn, White Leghorn	86	92	88	266
40 G. George, White Leghorn	66	96	103	265

EGG-LAYING COMPETITION—*continued.*FOWLS—*continued.*

Owner and Breed.	July.	Aug.	Sept.	Total.
41 Ontario (S.A.) White Leghorn	72	82	106	260
42 O.K. Poultry Yards, White Leghorn	34	106	119	259
43 Mrs. Younger, White Leghorn	41	97	121	259
44 Craig Bros., Black Orpington	70	97	90	257
45 A. E. Champness, White Leghorn	40	108	109	257
46 The Elms Poultry Yard, White Leghorn ...	51	92	111	254
47 *Mrs. McGree (No. 1), White Wyandotte ...	49	107	91	247
48 South Perth Poultry Farm, R.C. White Leghorn ...	61	91	92	244
49 Mrs. McGree (No. 2), White Wyandotte ...	40	90	108	238
50 *J. D. Wilson, Brown Leghorn	42	84	110	236
51 Hillview Poultry Farm, White Leghorn ...	51	92	83	226
52 Craig Bros. (S.A.) (No. 2), White Leghorn ...	49	81	90	220
53 Adelaide Poultry Farm, Buff Leghorn ...	33	82	104	219
54 F. Whitfield, Minorca	57	71	89	217
55 T. Hickey, White Leghorn	0	84	130	214
56 *Mrs. H. M. Kelley, Gold Wyandotte ...	33	85	96	214
57 J. Stuart, S. L. Wyandotte	57	72	83	212
58 R. L. Martin, Black Orpington	95	84	69	212
59 *Craig Bros. (No. 1), White Leghorn ...	30	93	88	211
60 *J. Stuart, Silver-pencilled Wyandotte ...	33	74	101	208
61 *White Wings Poultry Farm (No. 1), White Leghorn...	52	65	80	197
62 *Mrs. H. M. Kelley, White Leghorn ...	23	68	106	197
63 Craig Bros., White Orpington	57	73	60	190
64 J. Miller (late Dobson), Silver Wyandotte ...	34	59	40	133

Winner of first monthly prize, Mrs. A. S. Craig, Black Orpingtons, 131 eggs; second month, Mrs. A. S. Craig, 145 eggs; third month, A. H. Padman, White Leghorn, 146 eggs.

Winner of first three months test, Mrs. A. S. Craig, Black Orpingtons, 405 eggs.

DUCKS.

Six ducks and one drake in each pen.

Owner and breed.	July.	Aug.	Sept.	Total.
1 White Wings Poultry Farm, Buff	114	177	162	453
2 *Mrs. L. Mellen, Indian Runner	131	141	154	426
3 *G. Thomson, Indian Runner	131	135	150	416
4 H. Carr and Son, Indian Runner	142	137	136	415
5 F. Whitfield, Indian Runner	106	148	146	400
6 D. F. Vincent, Indian Runner	119	132	133	384
7 *Smith & Davenport, Indian Runner ...	116	128	136	380
8 J. Moyle, Indian Runner	114	115	137	366
9 C. Phillips, Indian Runner	101	117	144	362
10 C. Geddes, Indian Runner	89	134	134	357
11 Mrs. R. B. Moyle, Indian Runner	132	127	92	351
12 J. Robertson, Indian Runner	32	108	179	319
13 Greenville Poultry Farm, Indian Runner...	68	85	140	293
14 *South Perth Poultry Farm (No. 2), Pekin ...	7	116	160	283
15 Adelaide Poultry Yard, Indian Runner ...	49	105	122	276
16 Bon Accord Poultry Yard, Buff	54	86	132	272
17 A. W. Edgar, Indian Runner	12	96	149	257
18 *F. Whitfield (late Dusing), Indian Runner ...	72	48	108	228
19 South Perth Poultry Farm (No. 1), Pekin ...	0	50	137	187
20 Coolgardie Poultry Farm, Pekin	0	40	143	183
21 C. W. Johnston, Indian Runner	24	26	120	170
22 Simplex Incubator Factory, White Indian Runner ...	4	9	109	122

Winner of first monthly prize, H. Carr and Sons, Indian Runners, 142 eggs; second month, White Wings Poultry Farm, Buff Orpingtons, 177 eggs; third month, J. Robertson, Indian Runners, 179 eggs.

Winner of first three months test, White Wings Poultry Farm, Buff Orpingtons, 453 eggs.

EGG-LAYING COMPETITION—*continued.*

SECOND YEAR'S TEST—FOWLS.

Owner and Breed.				July.	Aug.	Sept.	Total.
1	J. Stuart, Golden Wyandotte	...	...	69	101	99	1,669
2	Craig Bros.' No. 1, White Leghorn	...	...	30	93	88	1,506
3	Mrs. McGree, No. 1, White Wyandotte	...	...	49	107	91	1,435
4	J. D. Wilson, Brown Leghorn	...	...	42	84	110	1,361
5	T. W. Martin (late James), White Leghorn	...	...	62	104	114	1,355
6	Mrs. Kelley, Golden Wyandotte	...	...	33	85	96	1,333
7	Adelaide Poultry Yard, R.C. Brown Leghorn	...	...	62	99	106	1,316
8	J. Miller (late Dobson), Silver Wyandotte	...	...	34	59	40	1,166
9	J. Stuart, Silver-pencilled Wyandotte	...	...	33	74	101	1,133
10	White Wings Poultry Yard No. 1, White Leghorn	...	...	52	65	80	1,092
11	Mrs. Kelley, White Leghorn	...	...	23	68	106	1,007

SECOND YEAR'S TEST—DUCKS.

Owner and Breed.				First year.	July.	Aug.	Sept.	Total.
1	G. Thomson, Indian Runner	...	...	1,571	131	135	150	1,987
2	F. Whitfield (late Dusting), Indian Runner	...	...	1,493	72	48	108	1,721
3	Smith and Davenport, Indian Runner	...	...	1,333	116	128	136	1,713
4	Mrs. L. Mellen, Indian Runner	...	...	1,244	131	141	154	1,670
5	South Perth No. 2, Pekin	...	...	840	7	116	160	1,123

EXPORT OF POULTRY TO LONDON.

The following information has been received from the Agent General, in reply to inquiries from the Department, respecting the export of dressed poultry from this State to the London market:—

Mr. H. J. Webb of the Central Markets, London, says:—

“(1.) The best time to land large young chickens and ducklings is during March, April, and May and the first half of June.

“(2.) Chickens should weigh from 2½ to 4 lbs. and ducks from 3 to 5 lbs. All ducklings should be fat, with white feathers.

“(3.) The best method of packing devised at present is, I think, twelve in a case, packed closely together but not so close as to get the breast or the bones broken when cases are nailed down or roughly handled.

“(4.) I am sorry I cannot give you the cost of shipment, and it is difficult to give you an estimate of the prices which might be realised, as it largely depends on the quality of the birds, their size and the method of packing. These are very important, as this poultry should be used by the monied classes who are likely to pay a good price for a first rate article. The prices would probably be from 2s. to 4s. each according to size.”

The Agent General has also forwarded a copy of some notes taken at an interview with Major Norton of the South Australia Government Agency:—

“Major Norton recommends that the information required could better be obtained direct from South Australian or Victorian authorities, who could supply the results that experience has taught.

"The weights are the same as quoted by Mr. Webb. Prices realised about 9d. to 10d. per lb., though sometimes better than this could be done if a favourable term was caught.

"Major Norton has shipped out samples of American and Russian poultry for Australian exporters to copy.

"A point Major Norton impressed was the selection of only the very best fowls and ducks, and further, that white-legged fowls should be selected for shipment as these fetch better prices than those with black or yellow legs."

ROYAL AGRICULTURAL SHOW.

Although this year's entries show a slight falling-off in the horse classes, Mr. Theo. R. Lowe, the Secretary, is perfectly satisfied that the Royal Show, which will be opened to-day (Tuesday, 20th) by His Excellency the Governor-General, will be in all other respects an assured success.

There is a very satisfactory increase in the sheep section, the most marked being in Romney Marsh. On the whole, the sheep entries are nearly double those of last year's show. Cattle, also, show an increase. The total number of entries reach the large figures of 4,227, as against 3,057 in 1907, and these exclude many entries which were received too late.

This year the Society will extend judging competitions to draught mares and fillies, and also merino rams, which will, no doubt, have an encouraging effect. Increased accommodation has been provided for agricultural produce. Every endeavour has been put forward to make the parade, in the presence of the Governor-General, a conspicuous spectacle and an object lesson of the progress the State's pastoral industry has achieved.

The Department of Agriculture's exhibition is a noteworthy feature, affording tangible illustrations of the capabilities of the soil and what the State and settlers alike are doing.

The exhibits include:—Butter from the Bunbury Butter Company; fine specimen of pointed cane grass from Dowerin; from Hamel State Farm exhibits of grain, maize in cobs and shelled, cowpeas, peanuts, beans, etc.; cotton, hops, seed potatoes and grasses; from Narrogin State Farm, cereals in straw, grain in sacks, wool of various breeds, mohair, fodder (green), grasses (growing), clovers and vegetables, besides butter, eggs, hops, and flax.

There are also exhibits of competition butter for the prizes of £7 7s. and £3 3s., offered by the Minister for Agriculture, Mr. Jas. Mitchell.

The Department is showing specimens of live stock from the State farms. Further interest will be given to the Department's court by a variety of exhibits from its museum, laboratory, and cool stores.

The cool stores exhibits comprise several varieties of grapes, apples, and pears, which are shown in boxes to demonstrate their condition after several months cold storage, and should prove an object lesson to growers.



IN THE NORTH-WEST.

1. Broome Jetty.

2. Cable Station, Broome.

DEVELOPMENT OF THE NORTH-WEST.

EXPERIMENTAL STATIONS PROPOSED.

The importance of taking practical steps to promote settlement in the Northern portions of the State, and encourage the introduction of tropical and sub-tropical cultivation, has not been lost sight of by the Department of Agriculture. There is no doubt that the Nor'-West possesses great natural facilities for the cultivation of cotton, kapok, coffee, tobacco, and many other valuable commercial products. The difficulty, however, is to induce people with enterprise to make a beginning in that direction, undeterred by a few obstacles which are considered to exist. In order to pave the way for the utilising of the rich resources of the far North it has been suggested that a tropical branch of the Department should be established with the special object of facilitating the development of the agricultural resources of the northern districts.

In this connection, the following letter, dated August 18, addressed to the Department by Mr. James Isdell, of Derby, will be read with interest:—"I received the list of tropical plants and seeds from Mr. Berthoud all right, but few private individuals care about devoting much time or expense in raising cotton, coffee, rubber, or other valuable products; mainly because none of them understand the proper methods of planting, attention, and the most suitable soil, etc. That is the advantage of my recommendation to the Government to start two or three experimental farms on a small scale, say, 300 acres each:—(1) one on the black soil coastal plain; (2) one on the red soil, Pindan; and (3) one on the Fitzroy black soil plains, and show people what can be profitably grown and how to do it. Under these conditions I am sure there would be very large settlement in West Kimberley. The soil, climate, and rainfall of 20 to 25 inches, are already there; all that is required is experience and knowledge, in which the Government should lead the way.

The Fitzroy basin, containing millions of acres of dark-brown alluvium of great depth, resting on a limestone bed, I am sure will grow anything with the help of irrigation. All the soil carries a lot of lime. There are some good gardens at most of the stations, and quite as good vegetables and potatoes grown as anywhere down South. Mr. Chas. Blythe, of Brooking Station, close to Fitzroy Crossing, has a splendid garden, and contrary to the opinion of many Southern people, has produced some of the best grapes for flavour I have ever tasted. I had a small bunch a few weeks ago. Fancy ripe grapes at the end of July—middle of winter! Mr. Blythe planted a vine five years ago, and it has grown wonderfully; it has a stem ten inches in diameter; all its branches are spreading out on a frame, and it bears a beautiful, large black grape. The curious part of it is that it is always in bearing and always in leaf; alongside the splendid large bunches of ripe grapes you can see the next crop of young grapes budding out, which will ripen early in December. Mr. Blythe tells me this is the fourteenth crop he has had in five years. Fancy, three to four crops of grapes per year! There is the vine for

anyone to see. The soil is dark-brown, with plenty of lime, and close to a spring of running water.

I would like to see the Government start an experimental farm somewhere up the Fitzroy, and show what can be grown. It is my belief that in years to come all this country will be closely settled and intense cultivation be the order of the day. Fruits, vines, and fattening stock on artificial grasses, with irrigation all over these vast stretches of beautiful black soil and limestone plains will take the place of the present occupants in stock-raising. I have seen some very curious botanical and geological sights in these large limestone ranges, botanical riddles that would puzzle any scientist."

The above letter has been submitted for the consideration of the Minister.

SLAG AND DUNG AS FERTILISERS.

The good effects of a dressing of dung and slag on hay and pasture are probably due, according to the report of Professor Gilchrist, to the following reason:—Dung is fairly rich in nitrogen, and especially in potash, but is rather poor in phosphates. It also adds useful organic matter. Basic slag, on the other hand, contains phosphates and lime, both apparently in sufficient quantity and in suitable condition for hay and pasture. The effect of the slag is to maintain and develop clovers which would be reduced by dung only, and the quality of the hay is therefore improved.

Phosphatic and Potassic Manures increase Soil Nitrogen.

In the same report there is an interesting note of the increase in the soil nitrogen caused by the application of phosphates and potash. Three of the experimental plots received annually for ten years—

1. No manure.
2. 200lb. super.; 150lb. slag; 100lb. muriate of potash.
3. The same as above, with addition of 150lb. sulphate of ammonia.

The plots were old land hay, and samples of the soil at the end of the ten years were tested for nitrogen. On the phosphate and potash plot the store of nitrogen in the soil had increased by .002 per cent., equal to 30 lb. of nitrogen, or about 200 lb. nitrate of soda per acre.

On the plot to which sulphate of ammonia was applied, in addition to phosphate and potash, there was a decrease in the soil nitrogen of .025 per cent., equal to about 375 lb. per acre, or the equivalent of about 21½ cwt. of nitrate of soda.

The soil was sampled to a depth of 6 in.

These results show how effectively phosphatic or phosphatic potash manures can collect nitrogen on pasture or meadow land, this being due to their development of clover and other nitrogen-collecting herbage. On the other hand, it would appear that when a nitrogenous manure is added to the foregoing, the development of these plants is checked, and consequently the increase of nitrogen in the soil is largely prevented.—*Mark Lane Express.*



On the Midland Line.

1. Pastoral country, Yatheroo. 2. Orange grove, Gingin, Midland Line. 3. Scene on Midland Line.

TAINT IN HAMS AND BACON.

By LOUDON M. DOUGLAS, Lecturer on the Meat Industry, Edinburgh.

Although such vast quantities of hams and bacon are produced, there has been very little attempt to understand the actual processes which occur in the transforming of the fresh pork into the finished article. The process of curing has varied very little for centuries, and the only difference between the present day system and that which was in vogue a century ago consists in using less salt than formerly; so that whereas cured meats at one time were heavily salted, they are now lightly salted in order to produce what is called "mild cured bacon" or "mild cured hams."

It is a mistake, however, to suppose that the mere dissolving of the salt, or any other ingredient which may be placed on the fresh meat, has the effect of "curing" the meat. It has no such effect, but really only prevents the development of the germs of putrefaction. In this connection it is interesting to note that the germ which produces taint in meat has been isolated. We are indebted to Dr. Klein for accomplishing this result, and his notes on the subject are of the most interesting character. Dr. Klein states that his examination of the muscular tissues showed that they were more or less discoloured. In very slightly tainted portions, the colour changed to a pale or dirty grey tint, while in strongly tainted portions the colour approached dirty green, and the microscopic examination of the muscles disclosed the fact that *tyrosine* was present. The origin of this crystalline nitrogenous product is somewhat obscure. It was discovered by Liebig in animal tissues and attributed by him to decomposition of the albuminous substances present.

The notable feature is that in the presence of taint a very powerful and objectionable odour emanates from the various joints. In the various specimens of tainted meats examined, it was found that a species of microbe predominated everywhere, and more especially in the parts which were highly tainted. These microbes exist in the form of cylindrical rods, only visible to the eye by means of a powerful microscope, but the same appearances occur throughout the connective and fatty tissues of the meat; and if the tissues are undisturbed the rods will present the appearance of being continuous, but very easily get broken up into short segments.

This particular microbe, which Dr. Klein has named *Bacillus foedans*, is not possessed of the power of moving, such as is characteristic of many other germs, but must rely for its progress on gradual multiplication. This feature, therefore, explains why it aggregates in some parts more than in others. The microbe is incapable of growing freely in the air, or if it is exposed to oxygen (*Anaerobic*); and it is also incapable of forming spores or seeds and, curious to say, the ordinary methods of culture of micro-organisms seem to be quite useless in this particular case, inasmuch as the usual media do not seem to support its growth.

The principal characteristic, however, of the experiments which have been made, is that while the germ grows in a substance like milk, a most disagreeable odour is emitted. Subcutaneous injections in guinea-pigs did not

produce any local or general disease, thus showing that the germ has no injurious effects. The facts which have been established in these investigations are very helpful in the process of curing. There can be no doubt that the germ is produced in meat from decomposition, which may be set up in several ways. If the meat is insufficiently chilled before the curing agents are used, or if the animals have been slaughtered immediately after a journey in which they have been knocked about, then putrefaction will almost certainly supervene. These germs, however, may be taken up in the cellar itself, and as they are so very small that some hundreds of thousands of them can rest on the point of a needle, then it will be understood that once they have obtained a location in a cellar they are apt to remain there.

I am of opinion, however, that the development of taint can be prevented by inhibiting the propagation of these germs by immediately pumping an antiseptic solution into the bacon and hams, and for this purpose I found that the best antiseptic mixture consists of—

- 55lbs. of salt,
- 5lbs. of saltpetre, and
- 5 lbs. of dry antiseptic (boric acid).

This mixture should be made up to 20 gallons with water, boiled and stirred till clear, then allowed to cool to the same temperature as the cellar.

I am familiar with the objections which have been raised to the use of boric acid in any form, but they seem to me to be empirical to a large extent, and not possessing any real virtue—the result, in fact, of mere prejudice. Such an inhibitory solution, if injected into bacon, enables decomposition, as it proceeds, to be controlled until the tissues become saturated with a solution of the curing agents. These curing agents consist generally of salt, saltpetre, and a preservative in solution. I have found in many cellars that the liability to taint is greatest when the atmosphere is in a stagnant condition and thus liable to encourage the propagation of moulds and similar organisms, and it is invariably the case that when once taint attacks a cellar it is with the greatest possible difficulty that it can be eradicated, without having recourse to strong measures.

The remedy is to clear out the cellar and after closing up all the apertures, evaporate within it a strong volatile germicide. I have found one or two of these to be highly effective, and when evaporated they search into the crevices of the cellar and so destroy any germs which may be lurking there.

After this cleansing process has taken place it is a wise thing to lime-wash the roof and sides of the cellar; and I am inclined to think that this should be done at least once a year as there is now available a machine which enables lime-washing to be done very rapidly, and it ought to form an annual operation in all bacon establishments.

CARE OF THE HORSE.

The waste in the improper care of horses is not so apparent as in some other things—a rat-hole in a grain bin, for instance—but it is none the less real. If you give a horse a quart of oats a day more than is best for him, you waste the oats just as much as if you had fed them to the rats.

It may be said here that a horse is seldom or never killed by overwork or over-driving. When this accident is supposed to happen, the truth is that the horse had been improperly cared for either before the work or after it. What a horse can stand in the way of work depends upon his general condition, his special condition at the time he is put to work, and the care given him after the work is over. And it is safe to say that no ordinary farm task, even at the busiest season and under the most trying conditions of weather, is enough to kill or ruin a sound horse if he is properly cared for.

In the proper care of the horse the first essential is a comfortable stable. The absolute warmth of the stable is not so important as its freedom from draughts. Next to these, damp is the worst stable enemy of the horse. Next to these two enemies come improper floors and mangers. A wooden floor, that drains properly, but that has no uncomfortable slant or inequalities, is the best, and though it costs more for repairs than a cement floor it is most economical in the end. Plenty of good dry bedding, a manger that can be eaten out of easily and that can be kept perfectly clean, and a halter strap long enough to let the horse lie down in comfort, are essential. Stables should be as light as possible. All disease germs prefer the dark, and flies do not object to it as much as is commonly supposed.

The best grain for horses is oats. They should be plump, clean, and free from dust. Unground oats are better as a rule, but where there is imperfect mastication, either on account of poor teeth, gluttony, or other causes, ground oats do better. The stomach of the horse is small, and the amount of feed which it can take care of at one time is limited. The quantity of grain fed should depend on whether a horse is working or not, and on the amount of work he is doing.

Watering is an important point. The rule is to water before the feed of grain, or at any rate not until some time after the grain has been eaten. Horses in the stable should be watered three times a day, and working horses more often. The need of water is increased in proportion to the perspiration. The freedom of perspiration is dependent too, perhaps, in some degree on the amount of water. Horses that have gone too long without drinking on a hot day will not sweat as they should, with the result that the blood becomes overheated. It is a mistake to refuse water altogether to a hot horse. A half-pailful may be given at any time, no matter how hot the animal is, providing the weather is not too cold. In very hot weather, a small drink at frequent intervals is the rule. The danger comes from allowing an overheated horse to drink all that it feels inclined to.

When a horse is very tired or is overheated, the best thing to do for him is to give him a good rubbing down. This at once makes him comfortable, and enables his skin to act normally in reducing his tempera-

ture and removing the impurities due to muscular activity. The grooming is not a matter of appearance only, but of health. Farmers frequently neglect their horses in this particular because they look on it as a matter of appearance only. The health of the horse depends upon the condition of its skin to a much larger extent than is generally supposed. The rubbing down and currying stimulate the surface circulation, and produce a feeling of well-being throughout the whole system which materially improves the digestion and assimilation of food.

A man who knows how can excite a horse to greater effort by quiet, encouraging talk than by shouting. Energy is wasted, and the value of the horse is impaired by all scolding, shouting, unkindness, whipping, and ill-treatment. The care of his horses is one of the things which often makes the good farmer get along better than the poor one.—*Agricultural Gazette*.

VARIABLE TYPES OF LUCERNE.

By W. L. SUMMERS in *S.A. Journal*.

No one familiar with the lucerne-plant can have failed to notice the marked differences not only in general appearance, but in shape and size of leaf of individual plants. Some plants are much more compact, more densely foliaged, than others, and a careful examination of a lucerne-field suggests the possibility of increasing the yields obtained from lucerne by a system of selection of the best plants for seed production. This may at first glance appear to be an impracticable task—to be, as it were, playing with the matter; but it must not be forgotten that all improved strains of plants originate by cross-breeding or selection from individual plants possessing the desired characteristics. An ounce or even less of seed from the selected lucerne plants can be multiplied indefinitely, and provided the progeny retain the characteristics of the parents, would undoubtedly be worth the trouble involved.

The Kansas State Agricultural Experiment Station is giving special attention to this question of the improvement of lucerne, and in view of the fact that lucerne is a leading feature in the agricultural prosperity of that State, the work in which the Experiment Station is engaged is of the utmost importance.

In a bulletin recently issued under the title "Alfalfa-breeding—Materials and Methods," the operations are fully described. In addition to the selection of seed-plants naturally possessed of the most desirable characteristics, artificial cross-fertilization is being resorted to on a large scale to fix these characteristics. Describing the plants resulting from a small quantity of seed of Turkestan lucerne, and also of first-grade alfalfa, which differed in no way from the standard lucerne-seed, the bulletin says:—"From the outset as the seedlings gained in size, the most marked and striking differences manifested themselves amongst the individual plants of the different plots in re-

spect to habit of growth, form, size, and colour-shade of the leaves, density of foliage, size and succulence of stem, and later in the colour of the flowers.”

In order to ascertain whether it would be possible to build up individual plants into pure races, something like 190 different plants were selected and marked for study. While these plants could be divided into about a dozen types in respect to their general habits of growth and colour, the individual variations were endless. Apart from the very important matter of total yield, the differences in the percentage of leaves to stems were very marked. Again, the size and colour of the leaves varied very materially. An indication of the extent to which these differences exist is given in the following figures:—

Sample No. 29.

Average number of leaves per stem	34
Percentage weight of leaves to total green weight of plant	67

Sample No. 91.

Average number of leaves per stem	28.9
Percentage weight of leaves to total green weight of plant	63.3

Sample No. 61.

Average number of leaves per stem	40.8
Percentage weight of leaves to total green weight of plant	49

Sample No. 89.

Average number of leaves per stem	37.8
Percentage weight of leaves to total green weight of plant	33.8

These are the extremes in respect to these two points. It will be seen that although Nos. 61 and 89 produced a greater number of leaves on the average stem, the percentage weight of leaves was much lower than in Nos. 29 and 91. The inference is that the leaves in the latter, though not so numerous, were larger and more succulent than in the former—a very important matter in the feeding-value of the crop.

During the course of these experiments in 1907, a severe freeze was experienced, resulting in the lucerne-field being badly injured; so much so that as a general rule farmers in the affected region lost their first cutting for the season, being compelled to mow the injured plants in order to stimulate vigorous growth. A careful examination of the experimental plots disclosed the fact that while the Turkestan lucerne remained, as a whole, green, some of the plants were killed right to the ground. Occasionally of two plants side by side one would be uninjured and the other severely frosted. With the ordinary lucerne the great majority of the plants was badly injured, but there were occasional plants unaffected, or at the most affected at the tips of the shoots only. As with the Turkestan lucerne, instances occurred where plants badly affected stood side by side with uninjured plants, suggesting that the absence of injury was due to some inherent characteristic of the plant and not to accident of situation, etc. Recognising the importance of securing a type of lucerne resistant to frost, special attention is being given by the Experiment Station to these plants. In view of the success achieved

in various parts of the world in the development of races of plants more resistant to cold, diseases, etc., than others of the same species, there appears to be good reason to anticipate a fair measure of success in this work.

As showing the greater power of resistance to frost possessed by the Turkestan lucerne, as compared with the ordinary lucerne, of over 700 plants of each variety which were examined, 39.3 per cent. of the Turkestan and 6.3 per cent. of ordinary lucerne escaped injury; while 2.2 per cent. of the former and 39.5 per cent. of the latter were seriously injured.

FOOD SUPPLIES OF GREAT BRITAIN.

The number of oversea cattle, sheep, and pigs entering the fifty-one markets in Great Britain from which returns were at the time available, was as follows:—

	Cattle.			Sheep.			Pigs.	
	Fat.	Store.		Fat.	Store.		Fat.	Store.
Year 1907	1,060,066	894,279	...	3,887,796	2,573,108	...	643,518	226,603
Year 1906	1,032,259	907,295	...	3,777,420	2,394,306	...	558,587	220,921

The increased dependence of the population on imported food is concisely shown by a comparison of the quantity per head annually received for a series of years. Returns of imports have been collected on substantially the same basis for over fifty years, and by arranging the figures in septennial periods the gradual growth of supplies is clearly indicated. Thus in 1859-65 were imported 126 lbs. per head of wheat and flour, in 1866-72 the quantity had risen to 146 lbs., and in 1873-9 to 200 lbs. In the next septennial period the quantity per head was 239 lbs., rising to 256 lbs. in 1887-93, 273 lbs. in 1894-1900, and 294 lbs. in 1901-7. In the three last periods the total crop of wheat in this country fell from 112 lbs. per head in 1887-93 to 88 lbs. in 1894-1900, and 75 lbs. in 1901-7. Even assuming therefore that the whole of the home crop was actually available for food (which, in view of the requirements for seed and other purposes, is not the case) four-fifths of the wheat consumed in the United Kingdom is supplied from abroad. In the case of another important article of diet—potatoes—the position is very different. The period of maximum imports was in 1873-9, when 23 lbs. per head were received, but in the following period the quantity fell to 13 lbs., and in 1887-93 to 8 lbs. Since then the imports of potatoes per head have risen to 13 lbs. in 1894-1900, and 18 lbs. in 1901-7, but the oversea supply still represents only a small fraction of the total consumption. The figures seem to indicate that potatoes may be regarded as forming a somewhat less important item in the national dietary than formerly. In 1887-93 the total crop of the United Kingdom amounted to 359 lbs., in 1894-1900 to 310 lbs., and in 1901-7 to 321 lbs. per head of the population. Comparing the first and last periods, and adding the imports and home crop together, it appears that the consumption of potatoes for all purposes has diminished by 28 lbs.

per head as compared with 1887-93, though it is greater than in 1894-1900 by 16 lbs. The greatest relative increase in imported supplies appears in the case of meat. The imports of beef and veal have increased from 3.3 lbs. per head in 1859-65 to 22.6 lbs. per head in 1901-7. At the same time imported pigmeat (including in that term bacon, ham, pork, etc.) increased from 4.2 lbs. to 19.9 lbs. per head. Mutton and lamb imports have increased from 1 lb. in 1859-65 to 10.7 lbs. per head in 1901-7. Imports of butter and margarine have increased from 3.5 lbs. per head in 1859-65 to 13.3 lbs. in 1901-7, while those of cheese increased from 2.7 lbs. in 1859-65 to 6.7 lbs. in 1901-7. The growth of the trade in imported eggs appears most striking when measured in this way, the number per head of population having risen from only 8 in 1859-65 to 53 in 1901-7.

AUSTRALIAN MEAT FOR INDIA.

The following interesting extract from the *Pastoralists' Review's* London letter affords an insight into conditions affecting the supply of meat in India, especially to the troops. The concluding sentences give evidence of opportunities for largely extending the export of meat from Australia to the great Dependency:—

“My proposals cover the supply of beef only, and not that of mutton. as, at present prices, frozen mutton could not compete with the local trade, while mutton is free from connection with religious scruples.

“The sole bond of union all over India between Hindus of every shade and caste and creed, high and low, whether Brahmins, Rajputs, Marathas, Sikhs, Dogras, Jats, or Gurkhas, is veneration of the cow. It is impossible to exaggerate by any description the depth of feeling on this subject common to all Hindus, in whose eyes or estimation no conceivable crime or sin exceeds in wickedness the act of cattle slaughter. Mussulman rulers in the past, when particularly desirous of conciliating their Hindu subjects, endeavoured to do so by prohibiting the slaughter of cattle. Frenzied riots have arisen with great loss of human life over the slaughter, here and there, by a Mussulman, of a cow. The first act of the Mussulman Commander-in-Chief of the rebel army at Delhi, in 1857, was the issue of an order in the name of the King prohibiting cattle killing—an order issued to draw over the Hindus to the rebel side. In the 18th century, when the great Maratha chief Madho Rao Scindia found himself practically ruler of Hindustan, with the King of Delhi in his power, he made the King issue a prohibition against cattle killing, and conceived that order to be the most valuable result of his conquests. At the present day in all Hindu native States of importance, the slaughter of cattle, and even the eating of beef imported from British territory adjoining this State in a time of famine is treated as a most serious crime, and is punishable with rigorous imprisonment.

"Suffice it to say that no more powerful means of attaching the Hindus to our rule exists than is to be found in endeavours on the part of the British Government to limit the slaughter in India of cattle for food. Total prohibition, in face of the needs of the Mussulman and Christian sections of the population, is not possible, but the Government would still earn greater devotion from its Hindu subjects, and from the Hindu princes, by substituting, as rations for the European troops, beef from Australia and New Zealand in place of beef from cattle slaughtered in Hindustan in Government slaughter-houses. For a time, at all events, the cost would be greater; but the troops would certainly be better fed, while the gain from a political point of view would be incalculable."

LIME—THE ESSENTIAL.

By R. DARBYSHIRE ROBERTS.

In order that the reader may the better understand the statements which follow, it may be advisable to remove misconceptions concerning the term "Lime." Thus—

- (a.) Limestone—Carbonate of lime—caustic.
- (b.) Burnt lime—Oxide of lime.
- (c.) Slaked lime—Hydrate of lime—somewhat caustic.
- (d.) Mild lime—Carbonate of lime—same as "Limestone," chemically—but finely divided.

These are the various forms of "lime" as understood by agriculturists. The "oxide" and the "hydrate" of lime rapidly become "carbonates" when incorporated with the soil through the action of the carbonic acid in the soil water.

Outside these forms, and possessing none of the properties of the above, are "sulphate" of lime (commonly called "gypsum") and "phosphate" of lime—in bones. These in the words of Mr. Hall, "do not supply the 'base' required—in fact do not contain any 'lime' in the farmer's sense." It will thus be seen that, as the "lime" in a superphosphate is a "sulphate," and that in bonedust a "phosphate," neither of these fertilisers convey to the soil "any lime in the farmer's sense" The general belief is that they do.

It is generally conceded that "lime" is good for the soil. The object of this article is to show that it is absolutely essential. It is absolutely impossible to reap the full benefit of artificial fertilisers or of plant food already in the soil if the soil be deficient in lime. Mr. Hall, director of the Rothamstead Experimental Station, in an article contributed to the "Journal of the Royal Agricultural Society of England," expressed a very decided opinion:—"For the proper use of artificial manures it is indispensable to know the amount of carbonate of lime in the soil, not merely the amount of lime soluble in acids, but the quantity of carbonate of lime which will neutralise acids, and serve

as the necessary 'base' for many of the chemical changes essential to the well-being of plants." Dr. Patterson, of the West of Scotland Agricultural College, Glasgow, in his "Basic Slag on the Farm," states:—"After a term of years the ability of the soil to respond to fresh applications of artificial manures will largely depend on its holding a sufficiency of lime."

When the agriculturist invests in the nitrogenous manures, nitrate of soda or sulphate of ammonia, in phosphatic fertilisers as superphosphates, or in potassic ones as sulphate of potash or muriate of potash, he is applying to the soil nitrogen, phosphoric acid, and potash respectively, which is not available to the plant until the "chemical changes essential to the well-being of plants," referred to by Mr. Hall, takes place. He is, as it were, supplying raw plant-food material which may, or may not, become available plant food. It behoves him, therefore, to see to it that the physical and other conditions of his soil are such as to ensure this "change." In this connection "it is indispensable to know the amount of carbonate of lime in the soil." "Manures are applied, not because the land is ever actually deficient in nitrogen, potash, or phosphoric acid at the time; they are applied rather because the natural supplies of these are in a form unsuitable to the plant. The importance of lime in land is that it hastens the conversion of the natural soil constituents into available forms." It will thus be seen that whether the "unavailable" plant food be naturally in the soil, or whether it is supplied through the medium of an artificial fertiliser in a less "unavailable" form, lime is essential.

It may prove both interesting and instructive to describe the chemical changes to which reference has been made.

1. Phosphoric Acid.—When superphosphate is applied "the moisture in the soil first dissolves the acid phosphates, and these combine with the 'bases' of the soil. (a.) If there is a fair supply of lime in the soil, the acidity is counteracted, and we get precipitated phosphate of lime—commonly called 'reverted' phosphate. (b.) If there is absence, or deficiency, of lime, the phosphate forms acid phosphates of iron and alumina, the sourness of which only gradually disappears; and these are less healthy for plant food than thoroughly and rapidly neutralised phosphates, such as would be formed in a soil well supplied with carbonate of lime." Dyer's "Fertilisers and Feeding Stuffs." The "reverted" phosphate is readily soluble to the roots of plants, and thus forms "available" plant food in a healthy form. The acid phosphates of iron and alumina, on the other hand, are not available as plant foods. Hence the "proper use" of superphosphates lies in its application to calcareous soils.

2. Potash.—This most important, yet neglected, plant food is generally conveyed through the medium of sulphate or muriate of potash. In these forms it is neither so readily available nor so beneficial as in the form of carbonate of potash. Lime converts the muriates and sulphates into carbonates. Clay soils are generally rich in potash, "locked up" in combination with silica and alumina. Lime releases it, forming potash compounds easily assimilable.

3. Nitrogen.—"No nitrogen, no life." This plant food exists in vegetable and animal matter as "organic" nitrogen, and in this form is applied to the soil by means of farm-yard manure—bone-dust, blood meal, and similar animal products. In this form, too, it is present in humus. The first product of the decay of nitrogenous organic matter is ammonia, a combination of the two elements hydrogen and nitrogen, which, in a commercial form is supplied

chiefly as sulphate of ammonia, a by-product of various manufacturing processes. As the plant cannot feed on nitrogen in either of these two forms a further "change" is necessary. The whole process—nitrification—is:—

First Stage.—Decay of organic animal and vegetable matter; rain, and particularly that accompanying an electric disturbance; sulphate of ammonia, and, sometimes guano supply ammonia.

Second Stage.—A group of bacteria (nitroso-bacteria) converts the ammonia into nitrous acid.

Third Stage.—Another group (nitro-bacteria) converts this into nitric acid.

Fourth Stage.—The nitric acid combines with lime, or other base, and forms nitrates. Lime is, by far, the most suitable "base." Then, and not before, does the nitrogen become fully available to the plant.

As the presence of lime is absolutely necessary to the nitrifying bacteria, as well as to the formation of nitrates, it is patent that lime is as essential to the "proper use" of nitrogenous fertilisers as it is to the others.

Having traced the "change" in nitrogen so far we may as well complete the round, and say that the plant conveys the nitrate nitrogen to the animal as protein: that the animal ejects the "waste" nitrogen in its urine, of which urea is the principal nitrogenous ingredient. This takes up water—through the action of fermenta—and becomes carbonate of ammonia—and so we are back at the first stage. We may add that ammonia being a volatile gas is easily lost. Kainit, if added to fresh farm manure, will "fix" the ammonia. So will gypsum.

We have dealt with "lime—the essential" only in connection with the profitable and proper use of commercial fertilisers. This by no means exhausts the subject. There are other phases of the subject just as important if not more so—if that be possible.

RECIPES.

Curing hides and skins.—"Old Hunter" in *Farmers' Union Advocate* recommends the following way to cure hides and skins for home use and to keep them soft and pliable. Mix a wineglass full of burnt alum with a cupful of water, spread the skin out and paint all over with a brush, and when quite dry paint all over with crude carbolic. When soaked for 24 hours you can either roll it up or do what you like with it, the moths will keep from eating it, and it will always be soft. To cure boar's hides for buggy brakes, just use the alum, and if the cowhide is large use half a cup full of alum.

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Ringworm in young cattle—Can be remedied by cleansing the affected parts with tar soap and warm water, then painting with saturated solution of iodine until cured.

PUBLICATIONS RECEIVED.

Records of the Australian Museum, Vol. III., Part 2.

New Species of Diaspine Scale Insects.—U.S. Department of Agriculture.

Woolly Aphis of the Apple.—U.S. Department of Agriculture.

Philippine Journal of Science—Botany.

Agricultural Journal of India—July.

Annual Report Agricultural Organisation Society (England).

Tobacco Caterpillar.—Department of Agriculture, India.)

Castor Semi-looper	Do.	do.
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Red Cotton Bug	Do.	do.
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Grades of Wheat (Central Exp. Farm, Canada).

Flax Plant	Do.	do.
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Report, Imp. Department of Agriculture (India), 1905-6, 1906-7.

Future of Cacao Planting.—H. H. Smith.

Agricultural Statistics, 1907.—Impl. Board of Agriculture.

Annual Report, 1906-7, Transvaal Department of Agriculture.

Forest Flora of New South Wales, Vol. IV., Part I. (J. H. Maiden).

GOVERNMENT LABOUR BUREAU.

OPERATIONS DURING SEPTEMBER.

The Superintendent of the Government Labour Bureau (Mr. J. Longmore) reports on the operations of the Labour Bureau for the month of September as follows:—

Perth.

Registrations.—The total number of men who called during the month in search of work was 833. Of this number 484 were new registrations and 349 renewals, *i.e.*, men who called who had their names registered during the months of July and August. The trades or occupations of the 833 applicants were:—Labourers 295, handy lads 78, handy men 72, farm hands 58, cooks 43, carpenters 23, gardeners 21, bushmen 19, grooms 17, blacksmiths 12, clerks, miners, painters and shearers 10 of each, drivers 9, bakers, engine-drivers and station hands 8 of each, hotel hands 7, butchers, caretakers, fitters and yardmen 6 of each, bricklayers, dairymen and kitchenmen 5 of each, ironmongers, orderlies, plumbers and strikers 4 of each, printers 3, waiters 3, and 54 miscellaneous.

Engagements.—The engagements for the month totalled 273. The classification was:—Labourers 70, farm hands 41, bushmen 37, handy lads 30,

handy men 18, shearers 13, cooks 8, farm lads 7, sawmill hands 5, woodcutters 4, drivers, grooms, orchardists, painters and station hands 3 of each, and 25 miscellaneous.

Kalgoorlie.

Registrations.—The applicants for work numbered 51. There were 25 new registrations and 26 renewals. The classification was:—Handy men 16, labourers 13, handy youths 7, blacksmiths 4, carpenters 3, barmen, fitters, and yardmen 2 of each, clerks and strikers 1 of each.

Engagements.—There were 5 engagements, viz., labourers 4, and 1 wood-cutter.

The female servants who called numbered 22. The new registrations were 11 and the renewals 11. There was one engagement—a general.

Northam.

Returns not to hand.

Women's Branch, Perth.

Registrations.—The new registrations were 112 and the renewals 52, total 174. The classification was:—Laundress-charwomen 36, housemaids 26, generals 24, light generals 23, cooks 18, housekeepers 15, nurse-needlewomen 9, useful girls 5, waitresses 5, cook-laundresses 3, and 10 miscellaneous.

Engagements.—There were 60 engagements. The classification was:—Laundress-charwomen 31, generals 14, light generals 6, housemaids 3, lady-helps 2, and 4 miscellaneous.

General Remarks.

The number of individual men who called at the central office, Perth, during the month for work was 833. This total is 140 in excess of the number for September last year. The engagements were 273, being 56 beyond that for September, 1907. Of the 273 engagements 225 were by private persons, and by Government Departments 48.

During the month there were 71 men assisted by railway passes from the Perth office. The fares refunded totalled £57 2s. 2d., and the sum of £4 10s. 11d. was received from employers to send workers; the whole amounting to £61 13s. 1d.

GARDEN NOTES FOR NOVEMBER.

Warm weather will be well set in during the month. Garden operations will be chiefly directed to keeping the soil well stirred so as to retain moisture. Planting will be limited to the amount of water available, but in Southern districts several varieties of vegetables can still be planted out. Safeguards from grass fires must be observed by keeping orchard and garden free of weeds. Plants lacking in vigour should be top-dressed with a little nitrate of soda or sulphate of potash, which will give them new life. In drier districts mulching the roots will invigorate trees and vegetables; decomposed straw spread over the ground will keep it moist. Mulch should not touch the tree trunk or stem of plant.

French and Kidney Beans can be sown where there is sufficient moisture to allow the crop to grow.

Beans.—Seed of suitable varieties can be planted this month.

Beet (Silver).—A summer vegetable. Strip outside leaves and the plant will continue to give leaves all through summer.

Cabbage.—Plant only in moist spots where irrigation is possible. Top-dress young plants. Spray for grubs with Paris green and water.

Carrots.—A few seeds can be sown to keep up supply.

Celery.—Earth up grown plants.

Cucumbers.—A few more seeds can be sown where moisture is sufficient.

Egg Plants.—Plant out young plants and shade from the sun. In moist ground a little more seed can be sown.

Melons and Pumpkins.—Cultivator should be freely used between the plants until the vines commence to run. Bugle pumpkins and pie-melons can be sown in moist localities, using mulch.

Sweet Potatoes.—Shoots and cuttings can be planted out and the ground kept cultivated until the vines begin to run.

Tomatoes.—Plants can still be planted out in cool localities shaded from the sun.

FARM AND FLOWER GARDEN.

During November the work of the farm will include the spraying of fruit trees (*see* Bulletin) and silage-making. Sow pie-melons, sorghum, and pumpkins for late crops.

In the flower garden make late sowings of half-hardy annuals; also calceolarias, cinerarias, cyclamen, etc. Plant seedlings for summer annuals, dahlias, and tuberose. Cut back chrysanthemums.

MARKET REPORTS.

WESTERN AUSTRALIAN APPLES IN GERMANY.

Messrs. Henry Wills & Co., and Mr. T. E. Inglis, who shipped a trial lot of apples from Albany to Germany, have received the following report from the Hamburg agents:—

“We received only one trial shipment in Hamburg this season, which was a very fine quality and commanded top price. Such fruit is wanted here, and the West Australian shippers should take advantage of our market.

“Grading as a rule gave satisfaction, although in some instances we found apples of different sizes mixed up together. Grading should always be done with the utmost care, our buyers having naturally much more confidence in such lots showing all fruit of same size than others with different size fruit. It would be advisable to grade the fruit uniformly, *i.e.*, A. for large, A.A. for medium, and A.A.A. for small fruit. Special fruit might be marked ‘Special,’ but only in case the fruit really merits this grading. To pack two or three boxes of special fruit is of no use whatever, and only lots of some 10 or 20 boxes or more can do well here.

“Packing was all right in general, although some packers ought to use more wood-wool. Large apples arrived sometimes badly bruised, which could have been prevented had sufficient wood-wool been used. During the passage the apples shrink to some extent, and for this reason as much wood-wool as possible ought to be taken. However, packers ought to choose clean, dustless wood-wool without smell or paper shavings.”

LONDON WOOL SALES.

Messrs. Dalgety & Co., Ltd., report having received the following cable from their London office under date of September 30:—Sales opened with a large attendance of buyers and competition was animated and the selection good. Prices for merino generally good, fine crossbreds and medium crossbreds unchanged, but inferior and faulty merino wools, as compared with the closing rates of last series, are par to 5 per cent. lower, shabby crossbreds are lower 5 per cent., slips wools are lower 5 to 7½ per cent.

GENERAL SUMMARY.

FARM PRODUCE.

The early part of the current month has been noticeable for a depressed condition of the markets for farm products. Chaff supplies have been much lower, few parcels coming to hand from time to time, the demand for medium oaten has been slack, while there has been an absence of prime lots, though there has been demand for better grades. Prices for wheat have ranged for

low medium from £4 12s. 6d. to £4 17s. 6d.; higher quality, £6, £6 5s., and £6 10s., f.a.q.: oaten, from £4 17s. 6d. to £5 10s. Straw, nominal, £3 and £3 5s.

In the Kalgoorlie market, prices for chaff have been in the neighbourhood of £7 7s. and £7 10s. for prime green; good green, £7; medium, £6 10s.

In the grain market an improved tone was manifested; milling wheat fetched 4s. 0½d., 4s. 1½d., receding to 4s. 1d. and 4s. as ruling rates; ordinary wheat sold at 3s. 11½d. Oats: none local. Algerian sold at 3s. 6d. and 3s. 7d.; New Zealand, 3s. 8d. and 3s. 9d. whole and crushed.

LIVE STOCK.

Sales have been fairly active and there were good yardings at various centres. Later quotations indicate the following prices all round:—

Cattle: Very superior cows up to £18 10s.; average for dairy cows from £12 to £14; inferior, £8 to £11; heifers, on first calf, £6 to £8; store bullocks, £5 15s.; steers, £4 15s. and £4 10s. 6d.

Sheep: Ewes, with lambs at foot, 21s.; inferior, 17s.; hoggets, 12s. 6d. to 14s. 6d.; lambs, 9s. to 12s. 6d. for prime.

Porkers, 30s., with sows inquired for.

Horses: Draughts, aged, to £20; inferior, £15; mediums, £48 to £50; hacks, to £20; light horses inquired for.

Messrs. J. M. Hopkins & Co. sold three Clydesdale stallions at 75, 110, and 160 guineas respectively.

At a special horse sale at Northam, Dalgety & Co. realised very satisfactory prices on account of Mr. A. C. McCorry, ranging from £5 10s. to £33 per head.

FRUIT, VEGETABLES, POULTRY, ETC.

Values were sustained and fine lots of various products being marketed, with brisk competition. Loquats are forward with good sales. Quotations as follows:—

Apples: Dunn's Seedling, 5s. to 9s. 3d.; Rome Beauties, 11s. 6d. to 15s. 6d.; Rymers, 10s. 6d. to 14s. 6d.; Rokewoods, 11s. to 14s. 9d.; Yates, 12s. to 15s.; Cleopatras, 10s. 6d. to 13s. 6d.; Sturmers, 11s. 6d. to 14s. 9d.; other varieties, 10s. 6d. to 15s.; medium and inferior, 8s. to 10s. Oranges: Navels, best, 12s. to 16s., medium, 8s. 6d. to 12s.; ordinary oranges, best, 8s. to 11s. 3d., medium and inferior, 5s. to 7s. 9d. Mandarins: Best, 9s. 3d. to 19s. 6d.; medium, 11s. to 14s. 6d. Lemons: Best medium, 7s. 6d. to 11s. 6d.; large and small, 4s. 9d. to 6s. 6d. Loquats, 11s. 6d. to 15s. 9d.; quarter cases, 4s. 6d. to 6s. 9d. Cape gooseberries, 4d. to 4¾d.; medium, 3d. to 3¾d. Strawberries, 9s. to 15s. per dozen punnets.

Vegetables: Cabbage, 4s. 6d. to 9s. 3d.; others from 2s. 3d.; red cabbage, half-bags, 2s. 9d. to 4s. 9d. Cauliflowers, 3s. 6d. to 8s. 9d.; others from 9d. Pumpkins: Ironbark, 5s. 9d. to 7s. 3d. Peas, 2¾d. to 4d. Broad beans,

1½d. to 1¾d. Carrots, 2s. to 2s. 6d. Parsnips, 1s. 5d. to 2s. 5d. Turnips, 7d. to 1s. 3d.; others, from 3d. Beet, 1s. 8d. to 2s. 1d.; others, from 8d. Swedes, 5d. to 1s.; bulk, 3s. 6d. to 3s. 9d. Celery, 1s. to 2s. 2d.; others, from 7d. Lettuce, 1s. 7d. to 3s. 4d.; others, from 7d. Rhubarb, 1½d. to 2¾d. Leeks, 6d. Potatoes: Best, to 17s. 6d.; small, from 11s. 6d.

Poultry, etc.: Prime table birds, 6s. 6d. to 8s. 6d.; medium and old, 5s. 6d. to 6s. 3d. Hens: Best, 5s. 6d. to 6s. 6d.; medium and old, 4s. 6d. to 5s. 3d. Ducks: Best, young lots, 6s. 6d. to 8s. 9d.; medium and old, 5s. 6d. to 6s. 3d. Turkeys: Prime, 22s. 6d. to 25s.; medium, 17s. to 21s.; hens, 14s. 6d. to 18s. Geese, 9s. 6d. to 12s. Pigeons, 1s. 8d. to 1s. 10d. Guinea fowls, 5s. 6d. to 6s. 9d. Carcase lamb, 4¾d. to 5¾d. Mutton, 4½d. to 5d. Beef, 2½d. to 4¼d. Pork, 6½d. to 6¾d. Veal, 4d. to 4½d. Butter, 1s. 2d. to 1s. 4½d.

Eggs: Best known local, 12½d. to 1s. 1d.; suburban and country, 10½d. to 11½d. Honey, 11s. 6d. to 12s. 6d.; medium and inferior, 9s. to 10s. 6d.

BULLETINS ISSUED BY THE DEPARTMENT OF AGRICULTURE.

Settler's Guide, 2nd, 3rd, 4th and 5th editions.

Handbook of Horticulture and Viticulture (A. Despeissis). 2s. 6d. and 1s.

New Dairying ("Agricola").

Production of Lucerne.

Diseases of Honey Bees (John Sutton).

What can be done by the Beginner on the Soil (Hon. James Mitchell, Minister for Agriculture).

Stack Silos (A. Despeissis).

Report of Proceedings of Conference of Producers.

The Diseases of Animals and Meat Inspection (J. Burton Cleland, M.D., Ch. M., Syd.).

Factory Dairying (J. A. Kinsella).

Vegetable Growing (G. Chitty Baker).

Examination of the W.A. Poison Plants (E. A. Mann).

Care and Treatment of Milk and Cream (J. A. Kinsella).

Hints to Stock-breeders (Weir).

Meat Inspection and Diseases of Animals (J. B. Cleland, M.D.).

Poultry, Care and Management of (F. H. Robertson).

Potato Culture (T. J. Wallas).

Back volumes *Journal of Agriculture*.

Tobacco Cultivation (H. Allerton Cowper).

Cotton-growing (H. Allerton Cowper).

Dingo Trapping.

The New Sun-Dial (W. E. Cooke).

Free copies of such publications as have no prices attached can be obtained on application.

Rainfall for the month of September, 1908, recorded at telegraphic stations in Western Australia, and averages.

STATIONS.	Total for September, 1908, in points. 100 points=1 in.	No. of wet days.	Average for September.	STATIONS.	Total for September, 1908, in points. 100 points=1 in.	No. of wet days.	Average for September.
TROPICS :				NORTH COOLGARDIE			
Wyndham ...	Nil	...	10	FIELDS :			
Turkey Creek ...	1	1	62	Sandstone ...	Nil	...	...
Hall's Creek ...	Nil	...	20	Wiluna ...	Nil	...	43
Fitzroy Crossing ...	Nil	...	10	Mt. Sir Samuel ...	Nil	...	59
Derby ...	Nil	...	1	Lawlers ...	Nil	...	55
Broome ...	Nil	...	6	Mt. Leonora ...	Nil	...	55
La Grange Bay ...	Nil	...	5	Mt. Malcolm ...	Nil	...	44
Wallal ...	Nil	...	10	Mt. Morgans ...	Nil	...	76
Condon ...	Nil	...	6	Laverton ...	6	1	74
Bamboo Creek ...	Nil	...	6	Murrin Murrin ...	Nil	...	57
Marble Bar ...	Nil	...	2	Yundamindera ...	12	1	85
Warrawoona ...	Nil	...	5	Kookynie ...	Nil	...	85
Nullagine ...	Nil	...	Nil	Niagara ...	Nil	...	46
Port Hedland ...	Nil	...	8	Menzies ...	29	2	55
Whim Creek ...	Nil	...	12	Mulline ...	12	2	118
Roebourne ...	Nil	...	7				
Cossack ...	Nil	...	8	COOLGARDIE GOLD-			
Fortescue ...	Nil	...	8	FIELDS :			
Onslow ...	Nil	...	7	Davyhurst ...	22	3	128
Winning Pool ...	Nil	...	25	Goongarrie ...	14	3	61
WEST COASTAL :				Broad Arrow ...	35	5	81
Carnarvon ...	Nil	...	28	Kurnalpi ...	30	5	83
Sharks Bay ...	Nil	...	41	Kanowna ...	38	5	69
Wooramel ...	Nil	...	58	Bulong ...	26	4	92
Hamelin Pool ...	Nil	...	45	Kalgoorlie ...	10	2	73
Northampton ...	33	6	225	Coolgardie ...	24	4	74
Mullewa ...	42	5	112	Burbanks ...	5	2	128
Geraldton ...	18	6	136	Widgemooltha ...	29	8	105
Greenough ...	18	5	179	Norseman ...	62	8	98
Dongarra ...	5	5	191	Boorabbin ...	29	2	78
Minginew ...	28	6	142	Southern Cross ...	32	4	81
Carnamah ...	43	5	141				
Dandarragan ...	98	6	290	S.W. COASTAL :			
Moora ...	38	5	209	Gingin ...	167	9	336
Walebing ...	78	8	216	Guildford ...	189	9	355
New Norcia ...	97	7	220	Perth Gardens ...	226	12	328
MURCHISON FIELDS :				Observatory ...	245	13	375
Peak Hill ...	2	1	29	Fremantle Signal	274	13	281
Abbotts ...	Nil	...	44	Station ...			
Gabarintha ...	Nil	...	80	Fremantle Oval ...	265	11	...
Nannine ...	Nil	...	49	Rottneat ...	139	12	266
Cue ...	Nil	...	48	Rockingham ...	213	11	371
Day Dawn ...	Nil	...	44	Jarrahdale ...	321	2	500
Lake Austin ...	Nil	...	76	Mandurah ...	239	14	436
Lennonsville ...	1	1	99	Pinjarrah ...	174	12	400
Mt. Magnet ...	Nil	...	57	Collie ...	220	11	536
Yalgoo ...	Nil	...	69	Bunbury ...	137	11	373
Murgoo ...	Nil	...	23	Donnybrook ...	252	14	494

RAINFALL—continued.

STATIONS.	Total for September, 1908, in points. 100 points=in.	No. of wet days.	Average for September.	STATIONS.	Total for September, 1908, in points. 100 points=in.	No. of wet days.	Average for September.
S.W. COASTAL—con- tinued.				S.W. INLAND—con- tinued.			
Busselton... ..	166	13	275	Wagin	86	8	223
Cape Naturaliste ...	150	12	...	Katanning	63	9	216
Karridale	232	14	431	Broomehill	81	11	265
Cape Leeuwin	155	19	334	Kojonup	75	11	272
				Greenbushes	292	16	444
S.W. INLAND: ...				Bridgetown	265	15	392
Kellerberrin	40	4	125				
Meckering	91	5	168	SOUTH COASTAL:			
Newcastle	113	5	216	Mt. Barker	165	13	365
Northam	59	6	173	Albany	244	18	393
York	36	5	167	Breaksea	242	18	290
Beverley	45	4	168	Bremer Bay	156	9	257
Brookton	74	5	...	Hopetoun	123	9	301
Wandering	92	10	310	Ravensthorpe	85	8	253
Pingelly	89	9	402	Esperance	177	10	275
Narrogin	136	10	204	Israelite Bay	46	10	152
Marradong	131	11	244	Balladonia	112	5	96
Williams	95	12	264	Eyre	110	10	100
Arthur	69	10	225				

E. B. CURLEWIS,
Divisional Officer for W.A.

REMARKS ON THE RAINFALL FOR SEPTEMBER, 1908.

With the exception of Balladonia and Eyre, in the South Coastal District, the rainfall for the month has been below the average. This is particularly marked throughout the S.W. District. With the exception of one (1) point at Turkey Creek, no rain has been recorded in the Tropics.

EDITORIAL REQUEST.

Correspondence and Queries are invited from subscribers and readers of the Journal on any subject of interest to agriculturists and other settlers on the land, either conveying useful information or seeking it. Suitable letters and contributions will be published and answers to queries given in the succeeding issue, if communications are received by the Editor not later than the fifteenth of each month.

Secretaries of Agricultural Associations, Societies, and Farmers' Clubs are kindly requested to supply corrections of the lists published in the Journal, such as changes of appointments, dates of shows and meetings, as well as any other items of interest.

WESTERN AUSTRALIA.**Prominent Liberal Provisions in Land Laws**

—AND—

CONCESSIONS TO SETTLERS.

1. A Homestead Farm of 160 acres. Application fee, £1; survey fee, £3; stamp, 1s. Conditions: Personal residence for six months in each of the first five years after survey, or residence on C.P. lands within 20 miles. Boundaries: Half to be fenced within five years; the whole within seven years. Improvements: 4s. per acre must be expended in the first two years, 6s. per acre during next three years, 4s. per acre during last two years, making total of 14s. per acre in seven years.

2. Conditional Purchase Lands. —From 100 acres to 1,000 acres at from 10s. per acre, payable in 40 half yearly instalments at the rate of 3d. per acre. Conditions: Personal residence for 5 years, one-tenth of boundaries to be fenced within two years, the whole within 5 years, and improvements to the full value of purchase money to be made within 10 years. Half the value of boundary fence may be allowed in estimating value of improvements. Conditional Purchase Lands may also be selected without the condition of residence, in which case the improvements in value must equal one and half the amount of the purchase money, but not exceeding £1 10s. per acre.

3. Land for Orchards, Vineyards, or Gardens, from 5 to 50 acres, from 20s. per acre, payable in three years. Improvements, including fence, to be completed in three years.

4. Full particulars as to conditions, areas, and further methods of obtaining land will be found in the pamphlet "Selector's Guide," obtainable on application to the undersigned.

5. Surveys are carried out by the State at half cost to selectors.

6. The Agricultural Bank renders monetary assistance to enable settlers to effect improvements when land has been substantially fenced.

7. On a selector proceeding to any district for the purpose of selecting land, the nearest Land Agent will supply all information, plans, and pamphlets, as well as a guide to conduct him to available land free of charge. In the event of an application for land being made, with the necessary deposit, a refund of railway fare may be obtained, if the deposit on land selected is equal to 50 per cent. more than the amount of the fare, and provided the application for refund is supported by a certificate from a Government Land Agent stating the place from which the selector proceeded for the purpose of selecting.

8. The Railway Department grants a special concession in the way of fares and freights for a new selector's family and goods, on production of a certificate of *bona fides* from the Lands Department. Any selector of an area of not less than 500 acres first-class land may obtain from the Lands Department an order for railway tickets and freight for his family, goods, and chattels, from the station nearest his present or late residence to the station nearest the land selected, the amount to be repaid to the Department by the selector by bills at 12 and 24 months, with 5 per cent. interest added; until the bills are paid the land cannot be transferred or mortgaged except to the Agricultural Bank.

9. Any new selector residing on his land can arrange passages for his wife and family to this State through the Colonial Secretary's Department.

10. Agencies are established at Menzies, Coolgardie, Kalgoorlie, Southern Cross, Cue, Northampton, Geraldton, York, Northam, Beverley, Newcastle, Bunbury, Katanning, Albany, Bridgetown, Busselton, Narrogin, Wagin, Pingelly.

R. CECIL CLIFTON,

Under Secretary for Lands.

Perth, Western Australia.



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Vol. XVII.—Part 5.

NOVEMBER, 1908.

PERTH :

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1908.

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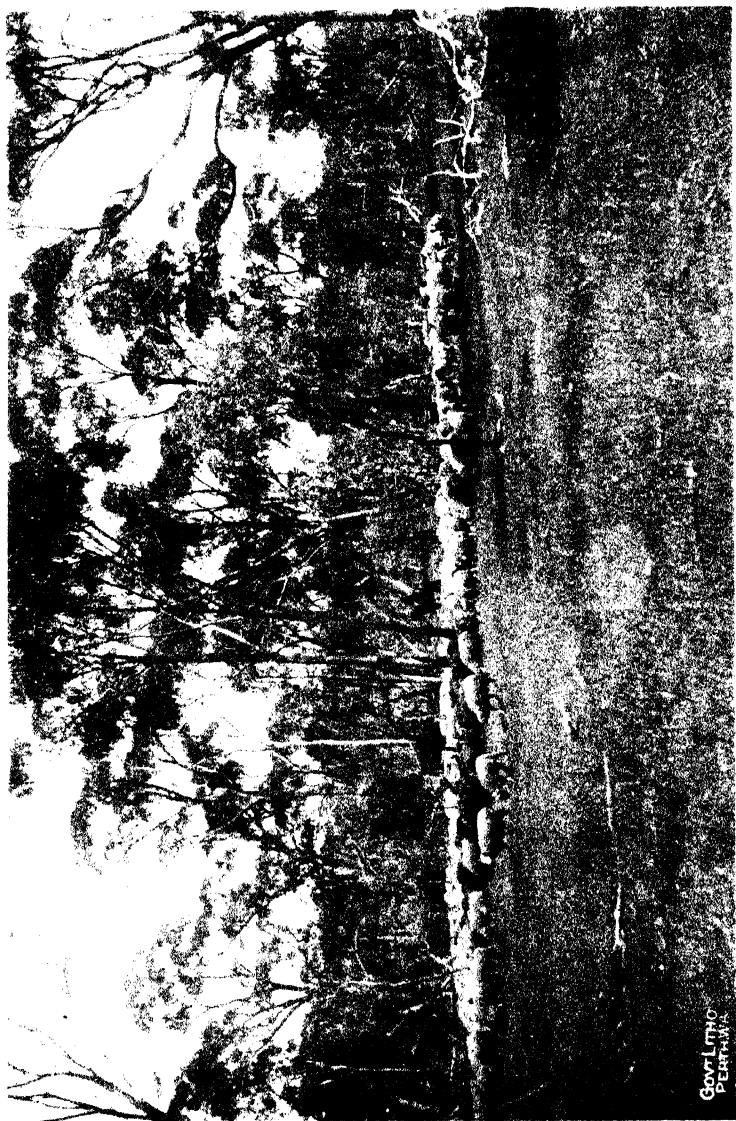


Fig. 1. A typical coastal landscape in Western Australia.

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Part 5.

NOTES.

Ensilage for fattening.—A consignment of bullocks fed almost exclusively on ensilage was sold from Cowra, New South Wales, recently at £17 5s. per head.

A prime bullock.—A seven-year old bullock, weighing 2,635lbs., was slaughtered at Nelson, New Zealand, and weighed after dressing 1,850lbs. The fat on his back was a foot thick.

Dairy progress in Argentine.—In Argentine there are 271 creameries, 18 butter factories, 68 cheese factories, and 37 "mixed" factories. The dairy industry is almost exclusively confined to the province of Buenos Ayres.

Export of Fruit.—The Agent General states that he has secured the allotment of cool-storage space of five tons capacity, for the Department, in the R.M.S. "Ortona," leaving Fremantle on March 15, 1909, for shipment of successive fruits from this State to Oriental ports.

Show at Bridgetown. The twenty-fourth annual show of the Nelson Agricultural Society will be held at Bridgetown on Thursday, 26th inst. A good prize schedule is presented, and the exhibition may be expected to give every indication of the progress of that fertile farming section of the State.

Emus and the Prickly Pear soil.—The *Pastoralists' Review* draws attention to the spread of the prickly pear pest in the Eastern States through the medium of emus. The birds are very fond of the fruit of the pear, and eat it in large quantities. Then they parade about, spreading the plant in clean country, as their excrement is a mass of pear seeds. In a very short time large areas of good country can be spoilt.

Rubber industry in Hawaii.—Rubber planting for commercial purposes was commenced in Hawaii in 1905, when 31,650 trees were planted. In 1906, the trees planted numbered 168,950, and in 1907, 177,050, making a total of 377,750 trees. There arrived in 1907 445,000 Hevea seeds and stumps and 200,000 Ceara seeds, which with those arriving in the following spring would bring up the grand total of plantings to about one million trees.

Prickly Pear Mosquito preventive.—M. Sanzean de Puybernean, a French physician, has made the discovery that the leaves of the common prickly pear, if chopped up and thrown into water, will prevent mosquitoes breeding in the water for weeks or months. The resinous mucilage of the leaves floats on the water surface, and chokes the breathing tubes of the mosquito. Further, in stagnant foetid water the prickly pear juice has the property of absorbing the gases of decomposition.

Sheep for farmers.—During the early part of next month a further consignment of 2,000 ewes will be received by the Department for distribution, on the usual terms, to farmers who desire to stock their selections. The last importation of a similar number have been advanced to applicants who regarded the sheep as very suitable on the points of age and frame for breeding purposes. Settlers in want of stock should make early application to the Department.

South Australian Wheat.—*The Standard of Empire*, of September 12, gives prominent notice to the South Australian wheat exhibit at the Franco-British Exhibition. In the course of its remarks the journal states that "Wheat-growing must take first place in dealing with cultivated land in South Australia, because the greater portion of the country is better adapted to the production of wheat than of other cereals. Moreover owing to its special qualities, there is always a ready demand in the markets of the world for Australian wheat, so that the farmer has no difficulty in disposing of his produce no matter how great the crop may be."

Trade in Copra.—Ceylon merchants are evidently anxious to enter into trade relations with this and other Australian States. Several inquiries in that direction have been received by the Department from the island dependency. The latest are from Messrs. Framjee, Bhikalee & Co., of Colombo, and Messrs. D. J. Ross & Co., and Mr. A. M. P. Ranasinghe, of Panadura, Ceylon, who desire to communicate with firms interested in the importation of Ceylon copra, cocoa-nuts, and poonac. The latter article is an oil product from the cocoanut. Perhaps some of our local importers can respond to the invitation of these firms.

Wheat-growing extraordinary.—A Russian named Levitsky has made a revolutionary discovery in wheat growth. By planting a single grain in a conical pit 18 inches deep, he has by special treatment raised 19,683 shoots from this single wheat grain, which is planted at the apex of the pit. As the first shoot appears it is earthed over, and as the leaf again shows itself, it is again earthed over, and so on till the pit is full. The plant sends out a number of new shoots at each earthing. This is the result of the experi-

ment, and if the harvest is equal to the plants, Mr. Levitsky's average in bushels to the acre should be very heavy.

The Agricultural Bank.—The transactions of the Agricultural Bank to the end of October show that in all the large sum of £808,600 has been advanced to settlers in the State. Of this amount, over £208,000 has been repaid, either by the borrowers or through the profits arising from the bank's transactions. The balance due at that date stood under £700,000, which is redeemable within a certain number of years. Loans continue to be granted from time to time to enable the struggling farmer to improve his property.

Fruit Export to Ceylon.—In order to test the possibility of establishing a fruit trade between this State and Ceylon, the Department has made arrangements for an allotment of storage space in the cool chambers of some of the mail boats for the purpose of making a trial shipment of fruit to Colombo in March next. These will include summer fruit such as peaches, grapes, plums, apples, etc. Intending shippers should prepare suitable products for this opportunity, and we learn from Mr. F. J. Wayman, Director of the Ceylon Bureau, in Emanuel Buildings, that Messrs. Miller & Co., of York Street, Colombo, are desirous of hearing from local fruitgrowers on the subject.

Abatement of the fly nuisance.—It has been found that flies have a great objection to blue colour, and will desert places coloured blue. The *Journal d'Agriculture Pratique* relates:—"A farmer housed 170 cows in different sheds; they were pestered with flies; but he observed that in one shed, the walls of which were of a blue tint, the cows were not worried. He therefore, added a blue colour to the lime with which he washed the walls of all his buildings. The following formula is used by him for the wash:—

20 gallons of water,
10 pounds slaked lime,
1 pound ultramarine.

The washing is done twice during the summer.

Spraying potatoes.—Says a correspondent in the *Rural New Yorker*:—"I spent part of my vacation upon a farm in Steuben County, N.Y., and was specially interested in certain fields of potatoes. The vines had been sprayed three or four times with Bordeaux Mixture, and were large, green, and still growing. The vines in some fields in the same county, and in most of the fields which I saw in the eastern part of the State, were entirely dead, and on these fields, I presume, no precaution had been taken to protect the vines from blight. In the section first referred to, an interesting experiment was made last year. On one farm seven and one-half acres of potatoes were sprayed several times. They stayed green until quite late in the season, and yielded 1,730 bushels, an average of over 230 bushels per acre, though some of them run up to 250 bushels. On adjoining farms, potatoes planted under similar conditions and with like care, excepting that they were not sprayed, ripened much earlier and yielded only from 125 to 150 bushels per acre. The trouble and expense of spraying were very small as compared with the value of the increased yield thereby secured."

The Strawberry.—The strawberry is a peculiar plant. Possibly no other plant is so prolific of good eating material if its environment is absolutely to its liking; but if the environment does not suit, it is balky and very obstinate about it. The different varieties are quite freaky about their choice of soil and climate, and while some variety will do well almost anywhere, if there is any way of telling in advance which variety to plant in a new section we do not know it. Except within quite wide limits the only way we know is to "cut and try." After strawberry plants have borne their third crop they quit business. Some more berries can be got from them, but no profit. Not in garden culture have we found it possible to get satisfactory results from new plants of the same variety planted in the same place, and that no matter how rich the ground is made. Nor have we been able to get satisfactory stock for planting from plants in which the runners had been constantly clipped until the crop is off and then permitted to take root. Such plants with us have been weak and poor bearers. Ideal strawberry plants would be from plants in which all blossoms are clipped off and the earliest runners allowed to take root. Probably they cannot be bought, but one having a satisfactory variety and intending to set out new plants can grow them. But in buying plants for setting one should make most careful inquiry as to whether the plants led or did not come from exhausted parents.

COTTON-GROWING IN THE EMPIRE.

The main portion of British-grown cotton is produced in East and West Africa. The cotton exports from the Sudan were valued at £23,000 in 1905 and £45,000 in 1906. The rate of development in Uganda is even more remarkable, cotton to the value of £11,400 being shipped in 1906-7, as compared with £1,089 in the previous year. Considerably increased shipments are also reported from Sierra Leone, the Gold Coast, and Lagos in West Africa. From the last-named place cotton to the extent of 2,440,000lbs. valued at £10,000 was exported in 1906, as compared with 1,281,000lbs. in 1905. In Lagos, it is stated, there are large areas of land suitable for cotton-growing, but transport difficulties are a hindrance to extended cultivation.

Considerable attention is given in the report to the development of the Sea Island cotton industry of the West Indies. In 1905 the exports of cotton and cotton seed from these colonies were valued at £63,000; in 1906 at more than £90,000, and for the year 1907 at £232,570.



SOUTH WEST DISTRICTS.

1. Mr. E. Rose's property, Bimbury.
2. Bush Scene, Brunswick.
3. Appleton Orchard, Mt. Barker.

NAMBAN CREEK PHOSPHATIC DEPOSITS.

The Minister for Agriculture, Hon. Jas. Mitchell, accompanied by the Under Secretary, Mr. A. Despeissis, Mr. Jas. Gardiner, and representatives of the Press, made a visit of inspection of the important phosphatic deposits recently discovered by the Geologist engaged by the Department, Mr. S. Goezel, from the Moore River of the Arrowsmith, a report of which was published in a previous issue of the *Journal*.

Several caves have been opened up and explored at Namban Creek, near the coast, in the vicinity of Cervantes Island.

The locality where Mr. Goezel is conducting exploring operations in one of the cave groups, is situated about 70 miles to the west of Moora, on the Midland Railway, and on the extensive range of limestone formation running within a few miles of the coast. At this spot Mr. Goezel and his helpers have their camp, and are conducting from this base their search for phosphates. So satisfactory have been the results of their investigations that there is a reasonable prospect of "the man on the land" being provided with a capital fertiliser at a cost which will, perhaps, be less than half that now obtaining. That these discoveries will be of inestimable value to the wheat-grower, and greatly improve the State's agronomic conditions generally goes without saying. The Minister regards this discovery as the most important development in this direction since guano was first made a useful and marketable quantity. There are now in sight in three caves about 10,000 tons of phosphates of high grade awaiting transport to Fremantle. In and around Namban Creek there are from 30 to 40 caves, the majority of which contain large quantities of the fertiliser, while it is now common knowledge that for a stretch of from 130 to 150 miles contiguous to the seaboard there exist similar deposits in large caves which have yet to be thoroughly opened up and explored.

The lowest depth of the caves so far explored is 40 feet. In some places the phosphatic deposits are from 6 to 7 feet in depth. They cover the flooring of most of the cave chambers. Here and there the men working under the geologist's direction have holes in the deposits, and it has been found that the grade is maintained throughout. Underneath the organic deposits there have been found phosphates on marine limestone, these being the result of water percolating through the animal deposits. Till such time as the "dirt" beds are removed there cannot be ascertained what quantity of this rock phosphate will be made available. If, however, Mr. Goezel's anticipations, based upon his investigations and theories, are realised this State will possess one of the richest and most valuable finds ever known. In any case the indications are that the supply of animal phosphates drawn from the "dirt" bed formations will before long be such as to more than supply the requirements of the users of fertilisers in Western Australia.

The Minister and his party were encouraged by a small but convincing illustration of the wonderful properties which the phosphates taken from the Namban Creek caves contain. At Minilon, which is on the outskirts of the belt of fine pastoral country which embraces Yatheroo, Yere Yere, and Kyanabra, Mr. Bower has his homestead. He cultivates just such a quantity of wheat, rye, and barley as to meet the needs of the stock which he raises.

Towards the end of August last Mr. Goezel sent him a couple of pounds of the phosphate for experimental use. The crops had already been sown a month or so. Mr. Bower mixed the phosphates in about four gallons of water, and sprinkled the solution over about 30 feet square of his rye crop. Three weeks later that portion of the crop was two inches higher than were the other portions which had not been so treated. At the time of the Ministerial visit, when the crop was beginning to ripen, it stood 15 inches or so higher than the surrounding crop, was thicker and of stronger growth, and showed much fuller head. It was but a small illustration, but Mr. Mitchell was greatly pleased with it.

In appearance the phosphate as it lies on the cave floors is similar to black earth with streaks of yellowish sand in it. It is light and soft but upon pressure takes the form of putty. To the first cave there are three entrances, but these are not sufficiently large to permit of the material being easily and conveniently brought to the surface. A shaft 30 feet in depth has been sunk into the largest chamber, which renders a large quantity of good grade dirt available for bagging and transport. One of the miners acted as guide, and as chamber after chamber containing the deposits were revealed it became at once apparent that the discovery was indeed a particularly valuable one. This conviction was the more forced upon the visitors when on the following morning they spent hours in passing from cave chamber to cave chamber and found themselves almost continuously walking over several feet of the phosphatic deposits which covered the floor. An important feature was that the raising of the stuff to the surface presented few, if any, difficulties, for short shafts through the limestone roofing are all that need be sunk. This will be found necessary in every instance, but the cost will not be at all heavy. In fact the work can be carried out at such light expenditure as to add very little to the price at which the phosphate can be supplied to those who require it.

That Namban Creek phosphate has feeding value equal to that of basic slag, or Thomas's phosphate, is shown by the analytical examinations which have been made of the various samples sent down from time to time to the Government Analyst. It contains phosphoric acid in a readily soluble state—that is to say is readily dissolved by weak acid solution. The other two grades of known phosphates occurring are the rock phosphate which can only be attacked by strong acid, and the superphosphate which is the result of that treatment. Namban Creek phosphate is practically ready for use as it is found. The immense value of the recent discoveries can only be appreciated when the statement is made that in three of the 30 odd caves known to exist in the immediate neighbourhood, there are actually in sight 10,000 tons of the fertiliser, and that within the limestone hill formations extending over 150 miles or so yet to be developed there are from 20 to 30 similar groups of caves. That country along the Moore River where phosphatic deposits were first discovered is held by landowners. The find was such as to excite Mr. Goezel to follow the limestone locations north, and as a result of his discoveries all of the country wherein the caves have been located has been reserved from selection.

WHAT THE DISCOVERY MEANS TO THE STATE.

According to an estimate made by the Minister for Agriculture, this State possesses, in addition to the thirteen million acres which have already

been alienated or are in process of alienation, fifty million acres of land suitable for agriculture. A reasonable anticipation is that, within a decade, of this total of sixty-three million acres from ten million to twelve million acres will be treated with phosphatic fertilisers for pastures or for cultivated crops. This, of course, will depend largely upon whether the agriculturist and pastoralist can secure the fertilisers at moderate rates in sufficient quantities. Fertilisers were imported to this State during the past three and a-half years in the following quantities:—

1905	..	..	..	221,936	cwt.
1906	..	..	..	271,014	„
1907	..	..	..	354,199	„
1908	(Jan 1 to June 30)			329,734	„

During the same period superphosphates were imported in the following quantities:—

1905	..	..	..	169,598	cwt.
1906	..	..	..	172,585	„
1907	..	..	..	189,597	„
1908	(Jan. 1 to June 30)			252,356	„

These quantities do not include the amount of guano brought from Abrolhos Islands. It may fairly be estimated that at least 1 cwt. per acre every third year would be a profitable application of superphosphate. On this basis the indication is that we shall require at a comparatively early date about 200,000 tons per annum if satisfactory progress is to be made in our agricultural industry. An outlay of £900,000 per annum would thus be involved if present rates are taken as a basis of calculation.

Australia secures its principal supplies of superphosphates from the rock phosphates taken from Ocean Island, which lies in the Gilbert Archipelago, east of New Guinea, and from Christmas Island, which lies to the south of Sumatra. The rock phosphate is treated in Japan, in Europe, and some of it in the Commonwealth. Seeing that Ocean Island is equidistant between Sydney and Japan, the Australian manufacturing centre would naturally be the capital of New South Wales. The Japanese, however, can manufacture and transport so cheaply that they stand in a fair way of controlling the Ocean Island phosphate market. This, naturally, has caused the Australian manufacturers some uneasiness. As we import it, superphosphate is made up chiefly of phosphatic rock, sulphuric acid, and gypsum, in such proportion that one ton of rock produces two tons of superphosphate. This treatment increases the cost of the local agriculturist very materially. Christmas Island rock, because of its comparative proximity to our shores should not cost more in freight than 15s. per ton between the source of supply and Fremantle. The phosphate rock is, however, taken to Europe at about 20s. per ton for freight, and having after treatment been doubled in weight is freighted out to us at about 18s., this being a loss under present conditions to this State of nearly 20s. per ton.

It will be seen, in view of the above facts, that the discovery of phosphatic deposits of good grade in large quantities means incalculable benefit to the agricultural interests of Western Australia. As a result of his visit Mr. Mitchell is satisfied that there are provided within our own lands fertilisers of high grade values in such quantities as to give the prospect of im-

portations to the State being rendered unnecessary for a time at least. To what lengths further discoveries will take us there are no present means of estimating. Mr. Goezel is confident that beneath the organic phosphates which cover the floors of the caves there lie thousands of tons of rock phosphates, caused by the percolating waters carrying the phosphoric acid in the deposits on the limestone beds and phosphatising the limestone. While, then, it has already been demonstrated that there are thousands upon thousands of tons of phosphatic deposits now available for use practically without treatment it is also probable that there will be available, in addition, thousands upon thousands of tons of rock phosphates in the same localities.

The cost of placing these phosphates on the market can roughly be estimated at 30s. per ton, although the first shipments. There is this fact apparent, however, that the farmer will shortly be in a position to secure his fertilisers at a cost to him of at least 50 per cent. less than he has been paying in the past. So soon as Mr. Goezel proved that these phosphatic deposits existed, steps were taken to reserve from alienation the whole of the country in which the caves containing deposits are known to exist. Developmental work is being carried out by the Department of Agriculture, and the supplying of the phosphates will also probably be done by the authorities. The user of the fertiliser will, therefore, secure his supplies at prices which merely cover the cost of transferring it from the caves to the wharf at Fremantle.

THE CAVES.

In the caves there are to be seen many fossilised fragments. Petrified portions of tree trunks and bone remains of amphibians are found on the roofs and sides and in the dirt beds. Differences in the size of corresponding bone remains of animals, belonging to the same family, disclose to the geologist great variety in the size of individual animals which in past ages inhabited the chain of islands now forming part of the mainland. Mr. Goezel found in one of the Namban Creek caves a beautifully-petrified specimen of a tree showing the characteristic joints and striation of a calamite. Solidified phosphatic material found in other caves disclosed, under the magnifying lens, that it consisted largely of minute bone particles. Mr. Goezel has come to the conclusion that this material was the excreta of piscivorous animals. Judging from the size of the bones the conclusion is arrived at that the animals varied in size from that of an elephant to that of a dog. While the fauna has undergone many changes since the time, ages ago, when the large accumulations were covered up by wind-blown sands it is concluded that the flora bore very close relationship to the present day flora of those parts. Mr. Goezel came to this conclusion after an examination of the flora of the oldest "dirt" beds and by the petrified tree specimens. Each group of caves is supposed to be connected by underground channels. The Namban Creek group runs its flood waters into the ocean through underground channels. Those caves wherein the animal deposits are found in greatest quantity are very lightly water-washed. The caves occur in the limestone hill formations which follow the course of the coastline, but at some four to six miles from the seaboard. These limestone ranges form a barrier between the swampy country in the plains on the east and the ocean on the west, and the water from these swamp lands reaches the ocean through the underground channels of which the caves form part.

BEAUTIFUL CAVE FORMATIONS.

Having traversed chamber after chamber of the phosphate-containing caves, the party were conducted to a large cavern, which was the first of many in which stalactites and stalagmites claimed greater attention than did the rich deposits covering the floors. Hanging from the dome-shaped roofs were stalactites in many forms and of varying sizes and colours. Formations of wonderful character were everywhere met with. So soon as one became used to the dim candle light—each member of the party carried a candle—the beautiful creations of Nature commanded the most rapt attention and created the greatest admiration. Everywhere could be seen monumental works carried out by Nature. Here a huge marble pillar; there a delicate crystallised stalactite which to the touch gave forth a bell-like ringing sound. To the expressions of delight made by everyone the guide merely answered, "This is dull in comparison with the new cave." His ideas proved to be true. While this particular cave was beautiful indeed, that newly discovered altogether eclipsed it in magnificence and grandeur. For the more easily accessible and better-known cave still showed on its flooring phosphatic earth, and thus demonstrated that the percolation of water through the limestone roofing must have commenced centuries after the more newly discovered cave had become a cave. So long had the process of stalactite and stalagmite building been incessantly carried on that the deposits in the newly-opened cave had become incrustated over with a flooring of highly-polished stalagmitic substance, with the result that those exploring felt that they were walking on coloured marble layers with brilliant crystallised decorations for roofing of the halls. To reach the chambers the party were required to clamber down a short shaft, and to then crawl in serpent-fashion some 20 feet or so. An upright position without risk of collision with hanging stalactites became impossible some 20 feet further on, and then chamber after chamber of gorgeous splendour were revealed. From the roof were suspended domes and myriads of long, vari-coloured stalactites. The marble-like flooring was everywhere studded with huge stalagmites, which in some cases also met the suspended stalactites. Here and there were seen huge pillars of pearly whiteness, to all appearances doing duty as roof supporters. Where below the stalactites there had not formed stalagmites there were large mounds, on the sides of which were terraces of delicate formation, in form similar to the famous pink terraces of New Zealand. But these cave terraces were of various colours, from a delicate whitish-pink to a dark brown. The summits of these mounds were of inverted bell shape, and they held small stones of various shapes and colours—the result of the continual dripping of water for ages. From the flooring in other places there rose large stalagmites of mushroom shape, while here and there were pools in the marble-like basement, over which had been formed a protecting transparent lid. In the centre of a shining ledge there had been a breaking away of the upper crust, which left an opening of oblong shape. Underneath there glittered crystals of all colours, the whole giving a replica of a well-laden jewel casket with the lid removed. From the sides of the caverns there hung flimsy shawl and curtain formations, which appeared to be of the most delicate texture and of different tintings. The forests of hanging stalactites were vari-coloured. Some were as alabaster and others of a coffee colour with streaks of blood-red running down them. Everywhere was something entrancing, something awe-inspiring, almost all indescribable. Those of the party who had

marvelled at the wonders of the Jenolan, Narracoorte, Margaret River, Yallingup, and Yanchep caves stood entranced with the wonderful works of Nature revealed in this Namban Creek cavern, and without hesitation there was a general agreement that there had now been discovered a cave for beauty, for splendour, for grandeur, and for magnificence the like of which Australia had never before dreamt of.

So soon as he had returned to the surface Mr. Mitchell gave instructions for this particular cave to be sealed up, for he considers that in days to come it must prove one of the greatest tourists' attractions in the Southern Hemisphere.

Half-a-mile nearer the coast another magnificent cave—larger in dimensions and more awe-inspiring, because of the immensity of the beautiful formations—was visited. It, too, will be saved from desecration, and until such time as the Caves Board declares it open for public inspection it will be sealed up. Though 70 miles from the railway line, and separated from settled parts by 60 miles of dreary, sun-baked sand plains, these caves are but 4½ miles from the seaboard; the nearest landing place is but eight hours' sail from Fremantle, and they are situated in a grove of tuart near placid pools of pellucid waters.

A FROST-PROOF POTATO.

Mr. P. W. Jenkins, of Clifton, Nimity-belle, New South Wales, has discovered a frost-proof potato (writes the *Sydney Stock and Station Journal*). Mr. Jenkins, who has been experimenting for years to get a potato that would stand the severe frost of the Monaro district, three years ago hit upon the one under notice. For a start only one potato was used, and this was cut into 13 sets, leaving only one eye for each set. The season was an exceptionally bad one, but nevertheless a yield of a kerosene tin full was obtained. From this lot, with another bad season to contend against, Mr. Jenkins got fully a ton, and this year, which followed an awful season, four tons were dug. The samples we have seen (the *Journal* continues) are very fine, and one great point is that these potatoes are much earlier than any other variety, and their frost-resistant properties are simply phenomenal. They have been cut down 13 times, and then gave a wonderful yield. No matter how the frost may affect the tops, there is positively no evidence of its ravages under-ground. The new potato is a tip-top boiler, thin-skinned, and a good saver. It is not waxy, but a true floury potato. Mr. Jenkins is hopeful that his frost-proof product will push ahead the potato-growing industry. In addition to its immunity from frost bite, it is so early that it would be possible in the most favoured districts to take out three crops a year. Mr. Jenkins has already sold some of the seed-potatoes at 12s. 6d. per pound.



GOV. LITHO
PERTHWA

ROYAL AGRICULTURAL SOCIETY'S SHOW.
Official Opening by His Excellency the Governor-General, Earl Dudley.

ROYAL AGRICULTURAL SHOW.

HIGHLY SUCCESSFUL DISPLAY.

The Annual Exhibition of the Royal Agricultural Society at the fine grounds at Claremont, which commenced on October 20th, and was officially opened by His Excellency, Earl Dudley, Governor-General, can be pronounced unquestionably as a most successful function, or more precisely speaking, daily succession of functions, terminating on Saturday 24th following. It possessed many remarkable features all more or less affording striking proofs of the stable condition of the great primary industries of the State, as well as unmistakable evidence of the present development and future progress of the important agricultural and pastoral interests. Thus, there was food for reflection when one came to realise that within the *coup d'oeil* of the extensive grounds fully 40,000 people were assembled on Wednesday afternoon, and that these numbered almost one-seventh of the total population of the State. No other State in the Commonwealth has ever put together so large a percentage of its people on any similar occasion. It was an object lesson of collective energy and individual enterprise flowing in the right direction for the building of a fine nation: a wonderful exhibition of how much has been accomplished by few people within a short period. These simple facts, no doubt, impressed Lord Dudley, to whom the Show was his earliest vivid introduction to Australian progressive activity. The whole results must have proved particularly gratifying to the Society's public-spirited president and energetic secretary, and other officials, as it was pleasurable and instructive to the thousands who visited the grounds during the week.

Its educative value to the agriculturists, especially the stout-hearted pioneers who, in many instances, are working under new and strange conditions, cannot fail to be most beneficial from many points of view, and to fill them with much encouragement. The business of turning the resources of the soil into productiveness was to be seen in all its various comprehensiveness, and with all those mechanical and scientific aids which modern ingenuity has conceived for the advantage of the man on the land. The inquiring or the critical visitor could pass in review the many assets in the field of production, from the raising of cattle, breeding of horses, farming of wheat, making of butter and pickles, to the growing of turnips and onions, through the entire range of farm life, testing in his mind the quality and worth of each class and comparing them with the respective standards of other countries, or other districts. It could be said without arrogance that in none of these, taking the Show exhibits as good specimens, did Western Australia need fear criticism or compare unfavourably.

The necessity has devolved upon governments of progressive nations to broaden their sphere of administrative policy, and urged by the aggressive spirit of competition, to become active participants in the industrial and commercial life of the people. Thus, under these inevitable national obligations, the State has merged into a farmer, producer, and exporter, in a general scheme to assist the individuals in the work of developing the stable resources of the country, and place their products in most profitable markets. We saw at

the Show what this State is doing in those directions. In the hall of the Department of Agriculture were numerous fine samples of cereal and root products from the several State farms and experiment stations, beside live stock entries in the stalls and pens. These displays, most of them having been prepared at the Hamel State Farm by Mr. Berthoud, attracted great attention. Another feature is the display of imported grasses, which include the African Wonder, *Paspalum dilatatum*, the Rhodes, and *Phalaris Commutata* varieties. The latter is a splendid type of grass, and is admirably adapted for dairying purposes. The exhibits of maize and potatoes, of which there were over 20 varieties, were all of good quality, the latter being all true to type. In the portion devoted to the Narrogin farm are some splendid samples of wool, of which there are four varieties--the Lincoln, the merino, the Shropshire cross, and the Lincoln-merino cross. Other exhibits include some excellent samples of clover, butter, oats, wheat, and flax. The Chapman farm is chiefly represented by some good specimens of cereals. Adjoining this exhibit is an interesting display of cotton fibres and tobacco shown by Mr. Pettigrew, of North Fremantle, and all grown in the exhibitor's private garden. The Brunswick farm is well represented, a feature being flax and barley of excellent quality, the latter being over eight feet high. In this section there are some samples of field peas, which are grown with the barley for the purpose of making ensilage. A display of fruit which has been in cold storage for periods ranging from four to six months, include grapes, packed in cork dust, apples, and pears, and are all in splendid condition. An exemplification of the value of cold storage is shown in the fact that when the fruits were first put down the prices ruling were from 80 to 100 per cent. lower than the prices obtaining at the present time. The Department showed, in practical form, the advantages of cold storage, and erected a model dairy with those necessary modern appointments and appliances without which the industry of butter and cheese-making cannot enter into successful competition with the rest of the world. In order that this branch should not be confined to mere dumb show, Mr. J. A. Kinsella, the Government dairy specialist, gave direct verbal explanation of the mechanical workings, principle and art of modern dairying, at the same time distributing useful literature on the subject. Another channel of immense value into which the State has entered was found in the highly interesting and attractive exhibits contributed by the entomological branch of the Department, which afforded to the flow of visitors a good conception of the researches made into the depredations of farm and orchard insect pests, and the methods adopted to overcome them. In another part of the hall, the poultry expert gave model illustrations of poultry-farming, the housing of the stock, and planning out of suitable runs. This is also an industry which the Department spares no pains to encourage and aid in establishing on proper lines. The efforts of the State were not confined to ocular demonstrations, for the Lands Department provided a bureau of intelligence in which literature in the shape of booklets, pamphlets, bulletins, and maps were liberally distributed for the benefit of the settler, and those who contemplated going "way back." These explained the provisions offered by the Lands Department the assistance given by the Department of Agriculture, and the easy terms on which advances are made by the Agricultural Bank.

Space in these pages does not permit of giving a detailed description of the great exhibition, of which the private and business displays formed

[By courtesy of *Western Mail*.]



Champion Jersey Cow, "Pussy Mabel," property of Mr. W. Padbury.

such prominent features and comprised exhibits from almost every agricultural area in the State, and in some classes—horses and sheep—were representative of the best quality the State possesses, though opinions differ in respect to thoroughbreds and draughts. The sheep entries, however, evoked a consensus of praise, the improvement in breeding being very marked. The same can be said of the quality of the dairy cattle and pigs; not omitting warm meed of the commendation of the poultry exhibits, of which many splendid specimens of different strains were found in the pens.

Probably nothing tended so much to focus the interest of the farmer and his household following as the machinery sections where were seen marvels of human invention and labour-saving implements upon the use of which the enterprising agriculturist is now so dependent. The exhibition was highly meritorious as well as instructive, whether in the form of six-furrow ploughs, irrigation plants, shearing machines, wind-mills, harvesters, drills, *et hoc genus*. With the whirr and throbbing of the various motive powers under practical demonstration in the presence of absorbed and moving crowds of onlookers, the scene was one of continuous animation, a moving picture of Australia at work.

The display of hams and bacon, preserved fruits, jams, pickles, etc., vehicles, saddlery and harness, besides other kindred articles, afforded ample evidence that much progress had been made in the State in establishing on a firm basis these indispensable industries. From the market garden and horticultural points of view, it can be declared that the display of vegetables and other garden products, fresh fruits, and the magnificent floral specimens, fully testified to the capabilities of our soil and the excellence of our climate.

The society has not been niggard in providing exhibition buildings, yet the accommodation of these was so heavily taxed for space for the adequate display of farm and home products of many kinds, and for the constant streams of spectators, that the necessity for enlarged capacity already forces itself upon the management, and it seems to be probable, also, that the same attention will have to be given to increasing the public seating accommodation by additions to the grand-stand.

THE PRIZE LISTS.

The following are the awards in the principal divisions:—

Thoroughbreds.

Stallion, any age: E. T. McMaster's Barbarossa, by Nordentfeldt—Algeria, 9 years, 1; A. E. Cockran's Bicolour, by Mostyn—Blue and White, 6 years, 2.

Stallion, any age, best suited for improving the breeding of others: V. C. Mitchell's Fisherman, by Satanus—Lady Victor, 6 years, 2.

Bred in Western Australia.

Stallion, any age: E. F. McMaster's Golden Key, by Barbarossa—Lily's Secret, 3 years, 1; H. Wills & Co., 2; H. S. Brockman's Matchlock, by Lockville—The Lark, 3 years 11 months, 3.

Colt, 2 years: E. Robert's Murus, by Mural—Trionia, 1; T. H. Wilding's Romany Lad, by Jay Rye—Lily's Secret, 2.

Colt, 1 year: M. Mulcahy's Mural's Pride, by Mural—Miss Tranter, 1; T. H. Wilding's Rossa, by Barbarossa—Essie, 2.

Mare, any age, visibly in foal or with foal at foot: E. Robert's Honeycomb, by Wandering Willy—Beeswax, aged, 1.

Filly, 1 year: T. H. Wilding's Lady Barbara, by Barbarossa—Lily's Secret, 1.

Open.

Mare, any age, visibly in foal or with foal at foot: E. Robert's Trionia, by Tremando—Gelasna, aged, 1; T. H. Wilding's Lily's Secret, by Padlock—Firebell, aged, 2.

PONIES, TROTTERS, ETC.

Arabs.—Stallion, any age: J. S. Mulcahy's Saladin, 14 years, 1.

Ponies.—Stallion, any age, not over 14.2: F. Hancock, 1; S. Thomas, 2. **Stallion**, any age, 13.2 or under: D. Lyons, 1; J. D. Sketcheley, 2; E. A. LeSouef, 3. **Mare**, any age, not over 14.2: Mrs. M. M. Young, 1; T. O'Beirne, 2; E. V. Roberts, 3. **Mare**, any age, 13.2 or under: H. Schmidt, 1; J. H. Sinclair, 2; J. Mitchell, 3.

Trotters.—Stallion, 3 years or over: H. Wills & Co.'s Van Osterley, 1; B. L. Clarkson's Wilks G., 2. **Colt**, 2 years: N. M. Brazier's Capel Tracy, 1; H. Wills & Co.'s Wisdom, 2. **Colt**, 1 year: N. M. Brazier's General Panic, 1; A. E. Cockram's Belmont Rover, 2. **Mare**, 3 years and over: A. E. Cockram's Belmont Queen, 1. **Filly**, 2 years: H. Wills & Co.'s Morning Glory, 2. **Filly**, 1 year: N. M. Brazier's Ziska, 1.

Hackneys.—Stallion, any age: Mrs. M. Hare's Bonfire, 1; C. Newnham's Quicksilver, 2.

Miscellaneous.—Mare, any age, best suited for hunters and carrying horses: H. S. Brockman's Mentoras, 1; A. E. Cockram's Belmont Opal, 2.

Champions.—Stallion: E. T. McMaster's Barbarossa, 1. **Mare**: E. Robert's Honeycombe, 1. **Reserve champion**: E. Robert's Trionia. **Pony mare**: H. Schmidt's Greygown. **Trotter stallion**: H. Wills & Co.'s Van Osterley, 1. **Reserve champion**: B. L. Clarkson's Wilks G. **Trotter mare**: A. E. Cockram's Belmont Queen.

DRAUGHTS.

Open.—Stallion, any age: J. F. Vaughan, 1; T. Wilding, 2; E. Fawcett, 3. **Stallion**, 3 years and under: W. Bodey, 1; A. R. Fenn, 2. **Mare**, any age, visibly in foal or with foal at foot: T. H. Wilding, 1; H. Wills & Co., 2. **Mare** or **filly**, any age: J. F. Vaughan, 1; T. H. Wilding, 2. **Mare**, 3 years and under: T. H. Wilding, 2. **Gelding**, any age: Perth City Council, 1; Jas. Spiers, 2; A. Duffy, 3.

Bred in Western Australia.—**Colt**, 2 years: H. Wills & Co., 1; V. C. Mitchell, 2. **Colt**, 1 year: J. Small, 1. G. P. Paterson, 2; T. H. Wilding, 3. **Mare**, any age, visibly in foal or with foal at foot: T. H. Wilding, 1 and 2. **Mare**, 3 years: T. H. Wilding, 1; H. Wills & Co., 2. **Filly**, 2 years, T. H. Wilding, 1; J. H. Vaughan, 2; H. Wills & Co., 3. **Filly**, 1 year: H. Wills & Co., 1. **Gelding**, any age: T. H. Wilding, 1; McLean Bros. 2.

Group Classes.—Stallion, any age, with not less than three of his progeny under 4 years: T. H. Wilding, 1. **Mare**, any age, with not less than two of her progeny under 4 years: T. H. Wilding, 1.

Suffolks.—Stallion, any age: J. McCallum Smith, 1. **Mare**, any age: C. Newnham, 1.



1. First Prize Shorthorn Bull; owned by Mr. W. McKenzie Grant,
Newmarraearra.
2. First Prize Two year-old Shorthorn Bull; same owner.

Champions.—Stallion : T. H. Wilding. Reserve champion : J. F. Vaughan. Mare: J. F. Vaughan. Reserve champion : T. H. Wilding. Suffolk Stallion: J. McCallum Smith. Suffolk mare: C. Newnham.

CATTLE.

Shorthorns.—Bull, 3 years and over: A. W. Edgar, 1; T. H. Wilding, 2. Bull, 2 years: Newmarracarra Estate, 1; A. W. Edgar, 2. Bull, 1 year: Newmarracarra Estate, 1; A. W. Edgar, 2 and 3. Cow, 3 years and over: A. W. Edgar, 1 and 2. Heifer, 2 years: A. W. Edgar, 1 and 2. Heifer, 1 year: A. W. Edgar, 1 and 2.

Herefords.—Bull, 2 years and over: S. W. Copley, 1 and 2. Cow, 2 years and over: S. W. Copley, 1. Cow, any age: S. W. Copley, 1. Heifer, under 2 years: S. W. Copley, 1 and 2.

Polled Angus.—Cow or heifer: E. Roberts, 1.

Red Polled.—Bull, any age: T. W. Hardwick, 1 and 2. Cow or heifer, any age: T. W. Hardwick, 1 and 2.

Fat Cattle.—Fat beast: E. Roberts, 1 and 2. Bullock, any age, E. Roberts, 1 and 2. Pen of two fat bullocks: E. Roberts, 1.

Champions.—Shorthorn bull: A. W. Edgar. Reserve champion: T. H. Wilding. Shorthorn cow: A. W. Edgar. Reserve champion: A. W. Edgar. Hereford bull: S. W. Copley. Reserve champion: S. W. Copley. Hereford cow: S. W. Copley. Polled Angus Cow: E. Roberts. Red polled bull: T. W. Hardwick. Reserve champion: T. W. Hardwick. Red polled cow: T. W. Hardwick. Reserve champion: T. W. Hardwick.

DAIRY STOCK.

Ayrshires.—Bull, 3 years and over: Mrs. M. Smith, 1; Geo. Forrest, 2; A. B. Perren, 3. Bull, 2 years: Jas. Spiers, 1; Mrs. M. Dempster, 2. Bull, 1 year: Geo. Forrest, 1; A. B. Perren, 2. Cow, 3 years and over: Mrs. M. Dempster, 1 and 2; C. H. Dunstan, 3. Heifer, 2 years: Mrs. M. Dempster, 1 and 2; Mrs. M. Smith, 3. Heifer, 1 year: Mrs. M. Dempster, 1; Geo. Forrest, 2.

Jersey.—Bull, 3 years and over: H. J. Hinde, 1; T. H. Wilding, 2; C. H. Dunstan, 3. Bull, 2 years: C. H. Dunstan, 1; T. H. Wilding, 2; Wm. Padbury, 3. Bull, 1 year: H. G. Hinde, 1 and 2. Cow, 3 years and over: T. H. Wilding, 1; S. F. A. Parker, 2; T. H. Wilding, 3. Heifer, 2 years: Wm. Padbury, 1; T. H. Wilding, 2; Hy. Wills & Co., 3. Heifer, 1 year: T. H. Wilding, 1; Wm. Padbury, 2 and 3.

Shorthorn milking strain.—Bull, 3 years and over: Hospital for the Insane, 1; F. M. Alcock, 2. Bull, 2 years: Hy. Wills & Co., 1; Hospital for the Insane, 2. Bull, 1 year: H. W. Hancock, 1; A. W. Edgar, 2. Cow, 3 years and under: A. W. Edgar, 1; W. H. Hancock, 2; A. E. Cockram, 3. Heifer, 2 years: T. H. Wilding, 1; H. W. Hancock, 2. Heifer, 1 year: T. H. Wilding, 1.

Holstein.—Bull, any age: R. Moore, 1; J. D. Manning, 2.

Dexter.—Bull, any age: W. E. Ash, 1. Cow or heifer: W. E. Ash, 1 and 2.

Champions.—Jersey bull, H. G. Hinde. Reserve champion, C. H. Dunstan. Jersey Cow: Wm. Padbury. Reserve champion: T. H. Wilding. Shorthorn bull: Hy. Wills & Co. Reserve champion: Hospital for the In-

sane. Shorthorn cow: A. W. Edgar. Reserve champion: T. H. Wilding. Holstein bull: R. Moore. Dexter bull: W. E. Ash. Dexter cow: W. E. Ash. Ayrshire bull: Mrs. M. Smith. Reserve champion: Geo. Forrest. Ayrshire cow or heifer: Mrs. M. Dempster. Reserve champion: Mrs. M. Dempster.

SHEEP.

Merino—Fine Wool.

Open.—Ram, 18 months or over: H. J. Lukin, 1 and 2. Ram, under 18 months: H. J. Lukin, 1 and 2.

Bred in W.A.—Ram, 18 months or over: H. J. Lukin, 1 and 2. Ram, under 18 months, H. J. Lukin, 1 and 2.

Open.—Ewe, 18 months or over: H. J. Lukin, 1; Newmarracarra Estate, 2. Ewe, under 18 months: H. J. Lukin, 1 and 2.

Bred in W.A.—Ewe, 18 months or over: H. J. Lukin, 1 and 2. Ewe, under 18 months: H. J. Lukin, 1 and 2.

Champion Merino.—Ram: H. J. Lukin. Reserve champion: H. J. Lukin. Merino ewe: H. J. Lukin. Reserve champion: H. J. Lukin.

Best W.A. bred ram exhibited: H. J. Lukin.

Strong Wool.

Open.—Ram, 18 months or over: H. J. Lukin, 1; H. W. Clarkson, 2; Mrs. M. Dempster, 3. Ram, under 18 months: H. J. Lukin, 1 and 2.

Bred in W.A.—Ram, 18 months or over: Mrs. M. Dempster, 1; H. J. Lukin, 2 and 3. Ram, under 18 months: T. H. Wilding, 1; H. J. Lukin, 2.

Open.—Ewe, 18 months or over: T. H. Wilding, 1; Newmarracarra Estate, 2. Ewe, under 18 months: H. J. Lukin, 1; W. V. Sewell, 2.

Bred in W.A.—Ewe, 18 months or over: H. J. Lukin, 1; W. V. Sewell, 2. Ewe, under 18 months: H. J. Lukin, 1; T. H. Wilding, 2.

Unhoused, Unclothed, Etc.

Bred in W.A.—Ram, 18 months or over: H. W. Clarkson, 1; Newmarracarra Estate, 2. Ram, under 18 months: A. W. Edgar, 1; W. V. Sewell, 2. Five rams, not over 2-tooth: H. J. Lukin, 1 and 2. Ewe, 18 months or over: Newmarracarra Estate, 1; H. J. Lukin, 2. Ewe, under 18 months: H. J. Lukin, 1; H. W. Clarkson, 2.

Fine or Strong Wool.

Bred in W.A.—Five rams, not over 2-tooth: H. J. Lukin, 1 and 2. Five ram lambs: H. J. Lukin, 1 and 2. Breeding pen: H. J. Lukin, 1.

Lincoln.

Open.—Ram, 18 months and over: H. J. Lukin, 1 and 2; Marwick Bros. 3. Ram, under 18 months: Marwick Bros., 1; H. J. Lukin, 2 and 3. Ewe, 18 months and over: H. J. Lukin, 1 and 2. Ewe, under 18 months: H. J. Lukin, 1 and 3; Marwick Bros., 2.

Bred in W.A.—Ram, 18 months and over: H. J. Lukin, 1 and 2; Marwick Bros., 3. Ram, under 18 months: H. J. Lukin, 1 and 2; Marwick Bros., 3. Ewe, 18 months and over: H. J. Lukin, 1 and 3. Marwick Bros., 2. Ewe, under 18 months: H. J. Lukin, 1 and 2; Marwick Bros., 3. Five ram lambs: Marwick Bros., 1; H. J. Lukin, 2.

The courtesy of Western Mfg.



Champion Merino Ram (Fine Wool), property of Mr. H. J. Lukins.

Border Leicester.

Open.—Ram, 18 months and over: G. P. Paterson, 1, 2, and 3. Ram, under 18 months: G. J. Gooch, 1 and 2; G. P. Paterson, 3. Ewe, 18 months and over: G. P. Paterson, 1, 2, and 3. Ewe, under 18 months: G. P. Paterson, 1 and 2. Five ram lambs: G. P. Paterson, 1.

English Leicester.

Open.—Rams, any age: Marwick Bros., 1 and 2.

Shropshire.

Open.—Ram, 18 months and over: Marwick Bros., 1; Jas. Byfield, 2. Ram, under 18 months: Marwick Bros., 1; Jas. Byfield, 2. Ewe, 18 months and over: W. H. Hancock, 1; Hy. Willis & Co., 2.

Bred in W.A.—Ram: 18 months and over: A. H. Henning, Harvey & Hayward, 2. Ram, under 18 months: H. W. Hancock, 1; Marwick Bros., 2; A. H. Henning, 3. Ewe, 18 months or over: Harvey and Hayward, 1 and 2; Jas. Byfield, 3. Ewe, under 18 months: H. W. Hancock, 1; A. H. Henning, 2; Hy. Willis & Co., 3. Five ram lambs: Marwick Bros., 1; Jas. Byfield, 2. Best ram under 18 months exhibited in above classes: Marwick Bros. Champions—Ram: Marwick Bros. Reserve champion: A. H. Henning. Ewe: H. W. Hancock. Reserve champion: H. W. Hancock.

Romney Marsh.

Open.—Ram, 18 months and over: H. W. Clarkson, 1 and 2, and champion. Ram, under 18 months: T. F. Quinlan, 1; H. W. Clarkson, 2. Ewe, 18 months and over: T. F. Quinlan, 1, 2, and champion. Ewe, under 18 months: H. W. Clarkson, 1 and 2. Five ram lambs: H. W. Clarkson, 1.

Oxford Down.

Open.—Ram, any age: G. J. Gooch, 1. Ewe, any age, G. J. Gooch, 1.

Dorset Horn.

Open.—Ram, any age: Cockram and Gordon, 1 and champion; S. F. A. Parker, 2. Ewe, any age: Cockram and Gordon, 1 and champion; S. F. A. Parker, 2.

Any other Pure Bred.

Open.—Ram, any age: Marwick Bros. 1; J. P. O. Wellard, 2. Ewe, any age: J. P. O. Wellard, 1.

Fat Sheep.

Bred in W.A.—Three wethers, not over 6-tooth: T. H. Wilding, 1. Heaviest wethers, any age: T. H. Wilding, 1; E. P. Paterson, 2; H. W. Hancock, 3. Three lambs, dropped after April 1: H. W. Hancock, 1; T. H. Wilding, 2 and 3. Shorn sheep or lambs: W. H. Hancock, 1. Lambs for export: M. T. Padbury, 1 and 2; H. W. Hancock, 3.

PIGS.

Berkshires.—Boar, over 12 months: Newmarracarra Estate, 1; G. D. Robinson, 2; Wm. Padbury, 3. Boar, over six and under 12 months: J. W. Robinson, 1; G. D. Robinson, 2; Newmarracarra Estate, 3. Sow, over

12 months: G. D. Robinson, 1 and 2; Newmarraearra Estate, 3. Sow, over six and under 12 months: G. D. Robinson, 1; Wm. Padbury, 2; J. W. Rolinson, 3. Sow, under 6 months: G. D. Robinson, 1 and 2. Champions—Boar: Newmarraearra Estate, 1; G. D. Robinson, 2. Sow: G. D. Robinson, 1 and 2.

Large Black.—Boar, over 12 months: Hospital for the Insane, 1; J. W. Rolinson, 2. Boar, over 6 and under 12 months: J. W. Rolinson, 1. Boar, under 6 months: T. W. Hardwicke, 1 and 2. Sow, over 12 months: J. W. Rolinson, 1. Sow, under 6 months: T. W. Hardwicke, 1. Champions—Boar: Hospital for the Insane. Sow: J. W. Rolinson.

Any other Pure Breed.—Sow, any age: Hospital for the Insane, 1; J. W. Rolinson, 2.

Miscellaneous (any recognised breed).—Sow, suckling her own litter: John Faulkner, 1; J. W. Rolinson, 2 and 3.

Exhibits suitable for trade purposes.—Porkers or light bacons, under 6 months: Hospital for the Insane, 1; G. D. Robinson, 2 and 3. Hutton Cup, for six bacon pigs, suitable for trade: T. H. Wilding, 1; Hospital for the Insane, 2.

DAIRY PRODUCE.

Fresh butter: C. H. Dunstan, 1; H. J. McDougall, 2; A. E. Clifton, 3. Bacon, factory, two sides: J. C. Hutton Proprietary, Ltd., 1 and 2. Bacon, factory, two middles: J. C. Hutton Proprietary, Ltd., 1. Factory bacon, rolled: J. C. Hutton Proprietary, Ltd., 1.

Hams, factory: J. C. Hutton Proprietary, Ltd., 1.

Lard in bladders: J. C. Hutton Proprietary, Ltd., 1.

Hen eggs: J. W. Rolinson, 1; Salter and King, 2. Duck eggs: Mrs. Ginder, 1; Mrs. J. H. Bucknall, 2.

Export butter: Bunbury Butter Co., Ltd., 1; Macfarlane and Co., Ltd., 2 and 3.

MODEL DAIRY DEMONSTRATIONS.

Mr. J. A. Kinsella, Dairy Expert of the Department of Agriculture, delivered several addresses during the Show at the model dairy erected by the Department of Agriculture. Mr. Kinsella laid stress on the importance of the milk question in the interests of public health. He said he had a great deal of sympathy for the dairyman who labours late and early, but greater sympathy for the health of the public and particularly for that of the young children, whose food should be largely composed of milk. Apart altogether from the great danger of disease being conveyed to infants through the medium of the milk, there is, said Mr. Kinsella, a large field for general improvement so far as procuring



Fig. 1. A view of the building of the Museum.

a cleaner milk supply is concerned. All pails, strainers, and cans made of poor quality of tin and badly constructed, are responsible for a considerable quantity of bad-flavoured milk and cream. In no case should rusty tinware be used, and all corners should be thoroughly flushed with solder. These corners often become propagators of dangerous bacteria, and very quickly seed that milk or cream with which they come in contact. All dairy utensils should have as few corners as possible. In this respect the small cans with cone-shaped necks are hardest to keep clean. Inside this type of can, even with our city trade supply, had been found a yellow coating which is a source of direct contamination. A much larger percentage of this description of cans is found dirty than of those cans with full open tops and straight sides. This latter type of can is called the gunshot can, and should have a neat float cover which can be pressed down against the milk or cream to prevent churning in transit. In washing all dairy utensils, "tinware," special attention should be paid to all corners and small crevices, and a good brush should always be used in preference to a cloth. The use of dirty cloths is a source of contamination, and one which often results in serious trouble with the flavour of butter and cheese. That the use of such cloths as referred to is too often practised on the farm cannot be gainsaid. Sufficient attention is not always given to this matter, even at factories. Too many milk and cream cans are, as a rule, washed in the same water, and although the first few cans washed may be properly treated, still, it is questionable if the last cans are not often worse after being slushed through half dirty water, than if they were not washed at all. The proper method of washing tinware is to first use tepid water with a brush until all milk or cream is thoroughly cleaned from the tin, then use hot water, and afterwards boil or steam them thoroughly. On the farm where steam is not available, boiling water should be substituted. At any farm where 10 or 20 cows are milked, a small steam boiler of the perpendicular type is a most valuable piece of machinery. In addition to cheaply furnishing hot water and steam for washing and steaming all tinware, such boiler can be used for working a milking machine, driving the separator, cooking feed, etc. After all tinware has been washed it should be placed in a clean place, if possible in the sun, for it must be remembered that sunlight is one of the greatest of disinfectants. Cloths should never be used for drying tinware. The steam or scalding water should produce sufficient heat for this purpose.

Mr. Kinsella gave a demonstration of straining milk with the Ula milk purifier or filter, which is the invention of a Swedish dairy authority. The strainer is composed of a cone-shaped piece of heavy-lined iron, with a receiving separate top, both of which are stamped out of solid pieces of iron, and possesses absolutely no corners or crevices to catch or hold dirt. There are also two discs of fine wire mesh, between which is placed a cotton wool disc each time the strainer is used. These milk purifiers are in general use throughout the whole of Denmark, where they have the cleanest and most up-to-date system of milking and treating milk. He explained the system of tethering the cows when feeding in the paddock, and the absolute cleanly system of straining and handling the milk from cow to creamery. This excellent state of affairs had not been brought about by stringent Acts of Parliament, but by practical instruction at the farm, and by educating the young in dairy schools and agricultural colleges, backed up by well thought out and practical dairy acts and regulations. These latter were

necessary and important in any country, for the reason that while nine farmers might produce a pure milk, it was the lazy tenth one who must be compelled to do his duty in the interests of public health.

THE SEPARATION OF MILK.

Mr. Kinsella traced the history of the centrifugal separator back to its discovery by a Swedish dairy scientist, and described in detail the old hollow bowl separator which were the old type of Bermister and Wain, and the Alexandra. The more modern types were now the most efficient, or, in other words, gave a most exhaustive separation of the cream from the milk. Among the more modern machines shown on the ground were the De Laval, Crown, and the Globe. Most of the latter types of machines had a bowl constructed in such a manner that the milk was divided into many thin layers in the bowl by means of a large number of cone-shaped steel discs. This dividing of the cream and the higher speed at which the bowl is run were responsible for extracting almost every particle of the butter fat from milk.

The lecturer dealt at some length with the old system of raising cream by the gravitation methods which were still practised by many farmers. This system, even though carefully carried out, was always responsible for a fairly large loss of butter fat in the skim milk. He described the Cooley system of raising cream by setting the milk in long narrow cans into a tank of cold water. This system, while a much better one than the old shallow pan system, also entailed loss of fat in the skim milk. He had often tested skim milk from the gravitation system on the farms which contained as much as $\frac{1}{2}$ per cent. of butter fat, and went on to describe how important it was for even the small dairyman to equip himself with some sort of centrifugal separator, by which means he can extract all the cream or butter fat from his milk. In these advanced days of dairy-farming no dairyman could afford to feed butter fat to calves when butter was selling at 1s. 6d. per lb. Some farmers argued that a little butter fat in the skim milk was good for the calf. He quite agreed with that suggestion, but from a business point of view it was not farming on skilful lines to attempt to raise calves with butter fat, when it was found that equally as good calves could be raised by feeding skim milk with the addition of a small quantity of oil-cake, meal, pea-meal, or some of the best known calf foods now on the market, and at about one-tenth the cost.

BUTTER-MAKING.

The Dairy Expert also delivered an address on the Show Grounds, taking for his object the process of practical butter-making. He said that about eight years ago the ripening process of cream used to be carried out by adding a small quantity of the previous day's butter-milk to the cream. Very often it was found that butter-milk had not a good flavour for ripening cream, and it was necessary for factory work and private dairies to introduce some other system. By taking a small quantity of pure milk with a temperature of 212deg. F., and maintaining it at this temperature for about 60 minutes, and immediately after cooling it down to 65deg. F., and then holding it at 65deg. F. for about 12 hours, a ripe culture was secured. Even this process was not always found reliable. Many bacteria might enter this milk

and produce an undesirable flavour in the cream and butter. Scientists had discovered by isolating germs of lactic acid that they were able to produce colonies of desirable bacteria. The great scientist, Chr. Hansen, prepared a lactic ferment, which was composed entirely of this species of bacteria in cream, which give a better flavour. Usually two gallons of fresh milk were required for the culture, and after the ferment was added it should be stirred occasionally for the first three hours and kept in a clean atmosphere. After making these preliminary preparations, the culture might be carried over from day to day for months. Absolute cleanliness was required in preparing the milk, and they must make certain that every utensil was perfectly clean, and the milk brought up to the proper temperature. If this was not done, a bitter flavour resulted. There were many different opinions among butter-makers as to what a "rancid" flavour really meant. It came from cream that had not been produced on cleanly lines. A great trouble in this country was the weeds, such as stinkwort. In butter-making they could overcome the weed difficulty by pasteurising the milk. The weed flavour could be overcome by introducing a first-class culture in the process of ripening cream. Farmers made a mistake by mixing various little lots of cream together. Each lot of cream should be separate in a clean vessel for 12 hours before going to churn, and thoroughly stirring. By introducing culture equal to about three per cent. many undesirable flavours were overcome. If a little butter-milk was held over from the previous day's churning, and added to the cream about 12 hours before churning, it would help the ripening process along, and add flavour to the resultant butter. A refrigerator attached to dairies gave great assistance in butter-making, for in hot weather there was a great loss of butter fat. The Babcock test could be applied, which would only take about ten minutes. Cream should be churned at a temperature of about 50deg. F., thus giving a better flavour and firmer to conduct. The exact amount of acidity contained in the cream from day to day could be ascertained. When the cream was placed into the churn, it usually took from 30 to 35 minutes for the butter to come. When the cream was breaking it was wise to add a little weak brine, as it tends to expel the butter-milk from the granules. After draining off butter-milk a quantity of water just sufficient to float the butter in the churn should be added, and the churn revolved rapidly for a few minutes. If the water drawn off showed any traces of butter-milk, this process should be repeated twice, and even three times in extreme cases, when the butter was in a soft condition, and when it was difficult to expel the butter-milk from it. It was always wise if at all possible to have the temperature of the wash-water a few degrees lower than the temperature at which the cream was churned. This latter tended to firm the butter up and gave it a better texture.

INTERNATIONAL CONFERENCE ON REFRIGERATION.

REPORT ON COLD STORAGE OF FRUIT.

By A. D. CAIRNS.

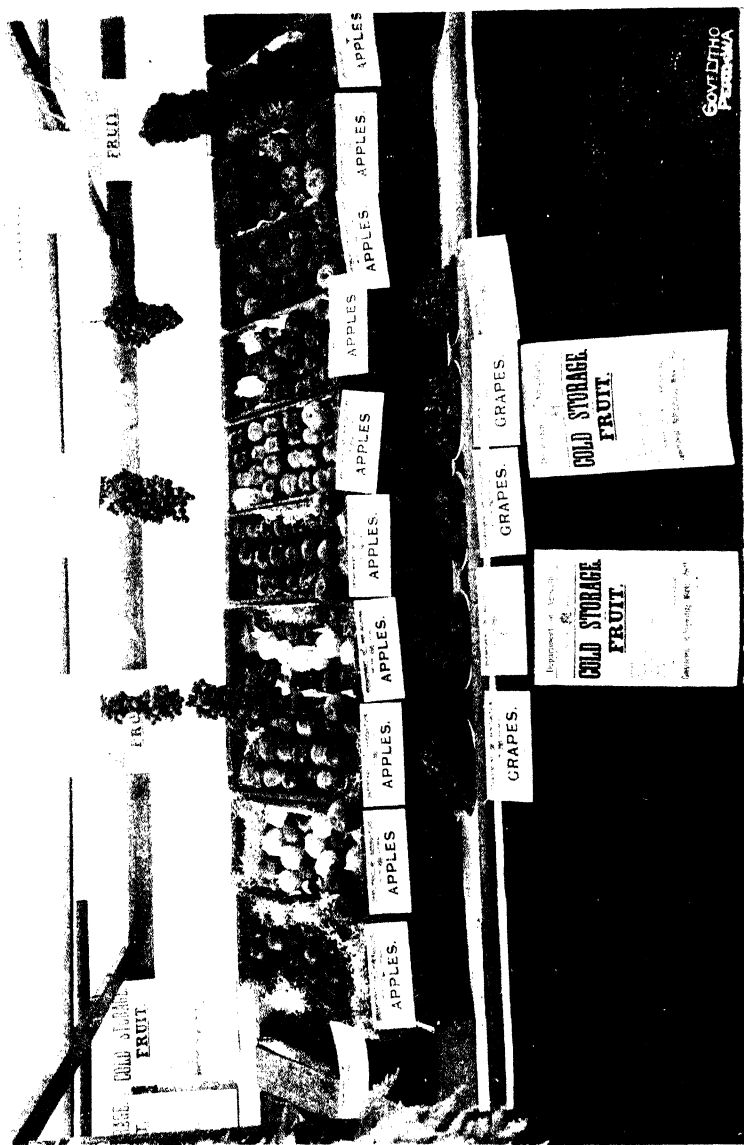
The following paper on cold storage in relation to the fruit industry was contributed by Mr. A. D. Cairns, Manager of the Government Refrigerating Works, Perth, to the International Conference on Refrigeration held in Paris, and will, no doubt, be read with interest:—

The Fruit Industry.

"Of the 975,920 square miles that form the area of Western Australia, reaching to within 14 degrees of the equator in the north, bounded by the Indian Ocean on the west, reaching south within a few hundred miles of the limit of summer ice drift from the Antarctic, while the eastern boundary is the 129th degree of east longitude, a fairly extensive variety of fruits may be reasonably expected, and doubtless will follow closer settlement on the thousands of square miles fit for this purpose. In the south and western portions of the State, where the bulk of farming and fruit-growing is undertaken, splendid results have rewarded the European pioneers who had faith in the unique climatic and soil conditions that met their first acquaintance with what was practically the last State in the Commonwealth to be thrown open for agricultural settlement. Western Australia did not keep pace with the other States until the important gold discoveries of the early nineties brought the inrush of people. The local requirements up to that period were easily met by the few farmers and orchardists whose settlement dated back in some instances to the beginning of the State's existence as such in 1829. During the last ten years settlement has increased as a natural result from the influx of gold seekers, and also as a consequence of the State becoming self-governing with its own Parliament in 1890. The various Ministries that have succeeded Sir John Forrest's of the above date have, with increasing attention to the requirements of the settler, noted the remarkable response the virgin soil makes to the hands of the cultivator, and have kept in view the ultimate independence of Western Australia from the other States for her supply of dairy produce, fruit, etc. While a respectable sum still must leave the State for the necessities of life, that at no distant date will be grown and manufactured here, the cold store is playing and will continue to play a most important part in such development.

Cold Stores.

"Up to the present year (1907) the cold stores of Western Australia differed entirely from the bulk of the Eastern States, in so far as they were but receiving depots for perishables grown elsewhere, but there are now indications that the tide has turned. The Department of Agriculture of this



DEPARTMENT OF AGRICULTURE - ROYAL AGRICULTURAL SOCIETY'S SHOW.

EXHIBITS OF COLD STORAGE FRUIT.

CONFEDERATE
FARMERS

State built a small cold store of about 50,000 cubic feet capacity at the period of the great gold rush of 1895-6, as a safeguard for provisioning the people. The mutton and beef supplies being mostly in the North-West, or over 2,000 miles away, it took some time till the live cattle and sheep transport was established, and the meat supply was in a large measure drawn from the cold stores of the Eastern States. Now that live stock supply and transport are better organised and substantially increased, the Department has seriously taken up the development of fat lambs for export as well as the fruit growers' need for an outlet. In the ordinary course of things, this State will have a large surplus of wheat, mutton, and fruit for export, within the next ten years, and by its comparative nearness to European markets will provide homesteads for thousands of European agriculturists and fruitgrowers, who can readily avail themselves of the concessions granted by the State Agricultural Bank upon proving their *bona-fides* as such.

Quality of Fruit.

"We now have 14,567 acres under fruit—the bulk of which is apples, and ten years ago the acreage did not exceed 4,000 acres. Railways have been made and others are in progress whereby the gravelly loams and rich soil areas, with natural drainage inside of the 25in. rainfall per annum area are having the giant jarrah (*E. marginata*) and karri (*E. diversicolor*) replaced by the more homely and profitable apple, pear, and grape vine. Railway transport now being reasonable and a sure market on the goldfields, the grower is improving in method and making a good living. While the pests that haunt the orchard keeper the world over are represented here, there are many compensations for the energetic cultivator ever alert with his spray and other means to keep pests in check, so that the apples of the clean orchard bring a much larger price, and have a further advantage of a larger quantity of first-grade stuff for the cold store.

Climatic conditions.

"From the Trappists' Mission settlement at Beagle Bay, 21 degrees south latitude, where the mango, banana, date, tamarind, coconut, fig, or lemon thrive well, right down to the southernmost limit of the State, the great expanse of millions of acres under a 1,000 feet above sea level, where the rainfall starts in April and ends in October, and where the fruit is harvested from January to May, is destined by nature in physical feature and meteorology to be one of the greatest fruit-producing countries of the world. There are still other millions of acres of rich, gravelly loams, a problem for the irrigationist of the future, that could grow, dry, and supply fruit for a large proportion of the world's inhabitants without an ounce of chemical fertilisers or mechanical assistance for their desiccation. The bulk of our apples, pears, peaches, apricots, and grapes grow between latitude 30 and 35 south and longitude 115 to 118 east, at an altitude ranging up to 850 feet. The best keeping fruit comes from the south, where the rainfall is over 30 inches per annum, the annual mean temperature ranging from 63 degrees Fah. at York to 58.1 degrees Fah. at Albany, an annual average relative humidity of 64 per cent. The lowest thermometric reading in this area on record is 27 degrees Fah., the highest reading seldom crosses 100 degrees Fah., and then only for a few moments after midday.

Storage Quality of Fruit.

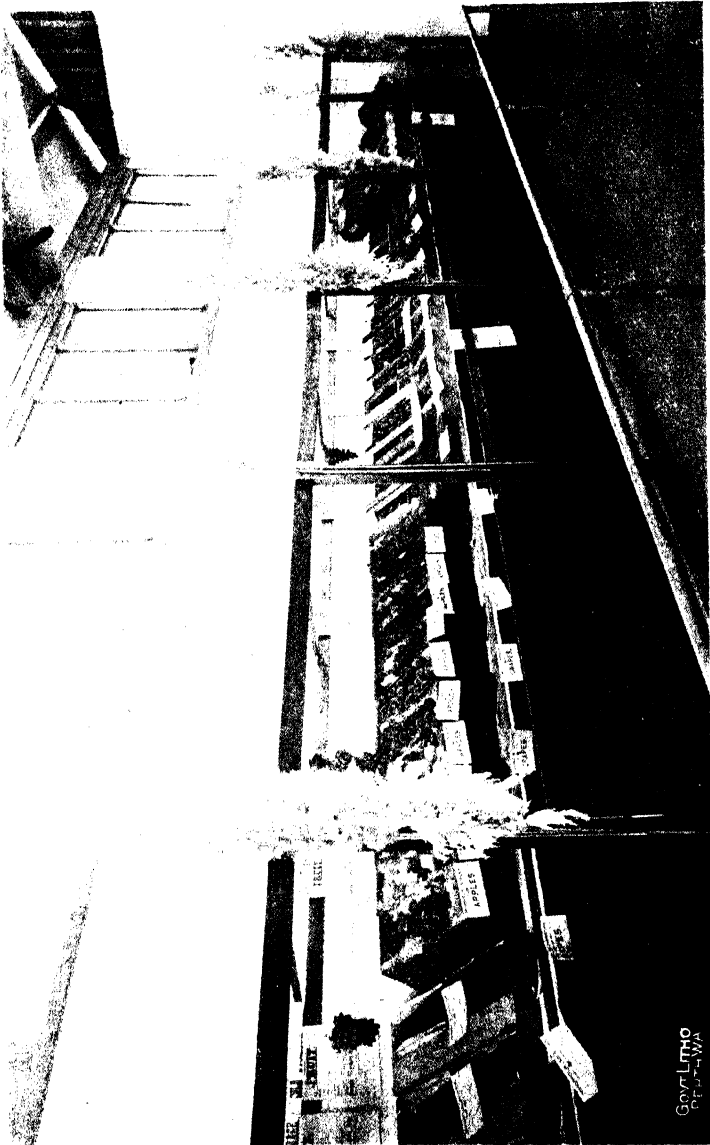
"The annual average evaporation is relatively high, being about 52 inches for the whole of the State, but this fact is generally far too abstract to worry the practical orchardist. He cultivates to retain moisture underground by frequent harrowings in the dry weather, and keeps a layer of dry soil on the surface as an insulant for the summer sun. He dry farms, and observes that the transpiration of the leaves of his trees is promoted to their maximum, and that their full development tends to shade the fruit in autumn; and this preparation for the cold storage man assures a hard, solid type of apple or pear that, no matter the variety, all things being equal, the pip fruit of Western Australia possesses potentialities for long storage or transport second to none. Where the European fruit-grower seeks the sunny slope to plant his orchard or vineyard, his contemporary here has no such worries, as the annual average for hours of sunshine is over two thousand seven hundred on a mean of seven point four hours per day, and we only average eighteen days per annum clouded throughout. The steady temperature of the cold store with its twenty-three hours out of the twenty-four of perfect darkness, with a steady humidity of 75 per cent. or slightly over, sets out sharply the soil peculiarities or cultivation defects. The various societies who send their products from the various districts have cases of their fruit periodically returned to them from the Government cold store, where the work is done gratis, and much useful data are tabulated by them in this way; they also see the average monthly returns that fruit brings in the public salerooms, and observe the prices the various grades and varieties bring.

Cold Storage Education.

"The development of black spot, bitter pit, core moulds, brown rot, scalds, also the extent of rough handling, finger-nail marks, stem punctures, and the thousand and one blemishing disfigurements that eat into his profits tax his ingenuity to overcome after his attention has been directed to such matters on visiting the cold store. By this direct method of instruction the Department of Agriculture of Western Australia educates the grower so that the bulk of middleman's aggressiveness is held in reasonable check, while his legitimate earnings are not interfered with. It is found that a good orchardist serves the State best by sticking to his work of growing, and while many improvements in the working of the Insect Pests Act are annually made whereby the importation of foreign pests is made more and more difficult, drastic measures are taken to enforce the clauses dealing with local or what have become local pests through so much importation during the great influx of the big gold rush.

Results.

"Results so far with sound fruit have given every encouragement to the growers. The case in use here for local fruit handling is 5½ inches deep, with a partition across the centre, giving two spaces 13½ inches square, and hold about 30lbs. of fruit. Apples in such cases entered our store in March, valued at 6s. by the grower, were sold in December of this year at 26s. for the Christmas trade. The other case used for shipping is 9 inches wide by 14 inches deep and 18¾ inches long, with half-inch spaces between boards for ventilations, and holds about 40lbs. of fruit. Fruit known as



Exhibits of Fruit. — Royal Agricultural Society's Show.

Govt. LITHO
G. F. 2-4-11

safe for long storage at 30 degrees Fah. to 33 degrees Fah. is, in the order of our experience for three seasons, as follows:—Results commercially profitable.—Ten Months' Safe Keeping—Rokewood, Dunn's Seedling, Yates, Yates improved, Statesman, Rome Beauty, Stone Pippin, Rhymer, Nickajack, Five Crown Pippin, Granny Smith, Jonathan. Eight Months' Safe Keeping—Ben Davis, Maiden's Blush, Esopus Spitzenberg, Smith's Cider, White Winter Permain, Hoover, Cleopatra, Northern Spy, Cox's Orange Pippin, Lord Wolseley, Alfriston.

"Pears.—Eight Months' Safe Keeping—Winter Nelis, L'Inconue, Josephine de Maline, Vicar of Wakefield, Beurré Boe, Keiffer's Hybrid. Six Months' Safe Keeping—Fertility, Beurré Clairgeau, Seckels. Four Months' Safe Keeping—Broom Park, Gansell's Bergamotte, Bartlett, Duchess d'Angoulême, Beurré de Capiamont.

"Peaches.—Lady Palmerston and Elberta were commercially successful after eight weeks' storage.

"Plums.—We stored experimentally Kelsey and Satsuma plums; when stored firm, either variety in a dry temperature of 36 degrees to 40 degrees Fah. will keep eight to ten weeks.

"Apricots.—Blenheim stands cold storage well for a month at 34 degrees to 36 degrees Fah., after which a carrotty flavour develops. Our trouble with this fruit is that after a couple of hundred miles of railway travelling on a tray in a ripe condition bruising has taken place, and spoils the cold storage man's chance.

"Nectarines.—Stand well at 28 degrees Fah. We held a couple of dozen cases four months under 32 degrees Fah., and found that the ordinary nectarine is capable of withstanding fairly low temperature when in its hard state.

"As the price in the local market for apricots, plums, nectarines, is very low, often under two shillings per bushel, very little interest has been evinced by growers.

Conclusions.

"With brine pipes for holding the temperatures steady, augmented by a Linde forced dry air system, and by a weekly burning of a small quantity of formalin on a hot bar of iron, we find the air in the rooms quite fresh. As the temperature and humidity question is a difficult matter to check always, we check thermometers by electric telephonic thermometer connected to the office, and hang pitchers of water in the passage ways between the fruit at different heights. A pail of water fourteen inches deep of a thickness of four inches frozen solid in six to eight days is a safe temperature check for apple and pear storage. The growth of mould on a few selected damaged exposed samples daily observed will be a guide for too much moisture, and a practised eye can soon detect the other extreme by a shrivelled skin.

"Our experience with most systems of cold storage plants operating in Australasia is that a compromise between the piped rooms and the forced air systems is better than either alone. No steady work can be done without the thermostatic effect of the brine pipes or walls, while no thorough cleansing and changing of the air can be effectually accomplished without the aid of the forced air principle. Wrappers are useful but not indispensable for long storage. Well-packed samples of any variety of apple will show a dead, decayed sample surrounded by perfect samples and no contamination for months, the natural grease on sound skins repelling attack.

A wet wrapper often transmits decay to others by capillary attraction. A fairly large body of brine, about 25 degrees Fah., held in the rooms frequently changed, and an hour or two twice per day of the fan running as in the Linde system, is the best obtainable for fruit storage. All fruit now exported from Australia is certified sound and free from disease under the Commerce Act, 1906. This Act was a sore point among fruit growers in Eastern Australia, as they considered fruit a natural product not liable to adulteration, etc., like any other export product, such as butter. However, the Minister in charge of Federal Customs remained adamant, and kept fruit exporters under the same responsibility as others, with the result that all fruit is more carefully inspected, and the name and guarantee are printed on each export case. Within no distant date the fruit export trade of Western Australia will have cold storage depots at Albany, Bunbury, Fremantle, and Geraldton, and this south-west corner of Australia, the first to appear geologically to prepare for fruit culture, is none the less fitted for a substantial contribution to the commerce of the Commonwealth, although she is practically the last to join the procession of progressive cold storage."

COWPEAS AND OTHER SOIL-RENOVATING CROPS.

Farmers' Bulletin 319 of the United States Department of Agriculture contains the following note on the value of cowpeas and other leguminous crops, not only on account of the actual yield obtained, but also through the soil-renovating influence of these crops:—

"Corn requires a strong, well-tilled soil, and upon thin land, deteriorated by bad management, the yield obtained soon drops below a remunerative average. Such lands will, however, profitably produce other crops of great value for the sustenance of farm stock, and, in addition, the growing of these crops will provide an excellent means of soil renovation. Lands that are now producing 10 bushels of corn per acre will, with much less labour, produce $1\frac{1}{4}$ tons of cowpea hay per acre, equal in nutritive value to 31 bushels of corn; or they will yield $1\frac{1}{4}$ tons of peanut hay per acre, equal in nutritive value to $23\frac{3}{4}$ bushels of corn, and in addition a peanut crop of 25 bushels per acre may be secured.

"On rich lands that under good culture will produce 40 or more bushels of corn per acre, satisfactory results can be secured by planting cowpeas between the rows of corn. Even rich alluvial soils, estimated to yield 40 bushels of corn per acre, if sown to alfalfa, frequently produce 5 tons of hay per acre in a season, equal in feeding value to $105\frac{1}{2}$ bushels of corn. In addition, such crops as cowpeas, peanuts, and alfalfa rapidly enrich the soil, and leave it in excellent mechanical condition for the ensuing year."



DEPARTMENT OF AGRICULTURE - ROYAL AGRICULTURAL SOCIETY SHOW.

Farm Products from Hamed State Farm.

GOVERNMENT
PERTH-WA

THE USE OF PRESERVATIVES IN FOODSTUFFS.

BY LOUDON M. DOUGLAS, College of Agriculture, Edinburgh.

For some years past there has been a continuous campaign waged between the public analyst on the one hand, and manufacturers of special foods on the other, in connection with the question of the use of preservatives.

Preservatives in the United Kingdom are extensively used in various proportions in many prepared foods and, while many prosecutions have arisen, it has never been shown that the use of a preservative derived from boracic acid is in any way injurious to health. It will be remembered that a Royal Commission was appointed by the British House of Commons to investigate this matter, and held its deliberations in 1900-1, and they agreed that certain proportions of boracic acid should be allowed in butter, milk, and cream. They, however, would not make any pronouncement with regard to sausages, and with the consequence that there has always been some little doubt with regard to that extensively made food.

Quite recently, a prosecution at the instance of the local analyst was raised in the Town of Burnley, and it was found that sausages sold by an agent of Messrs. Palethorpe, Ltd., of Dudley Port, contained 29 grains per pound. Upon this evidence a conviction followed, and from this Messrs. Palethorpe decided to appeal at the Quarter Sessions held at Burnley during July last.

The appeal was brought before the Recorder, and a great deal of technical evidence was led, more especially for the defence, and while such an authority as Dr. Kenwood was called to support the prosecution, an array of technical skill for the defence included such well-known names as Dr. Klein, of St. Bartholomew's Hospital; Dr. Hutchinson, Author of "Food and Dietetics"; Mr. A. G. Saloman, Bacteriologist; Mr. F. G. Lloyd, well-known as the Chemist to the British Dairy Farmers' Association; Mr. Moore, Analyst to the County of Dorset; Mr. Loudon M. Douglas, Lecturer at the College of Agriculture, Edinburgh, etc., and some others.

The principal evidence establishing the custom as to the use of a preservative, was derived from "Douglas's Encyclopædia," which was accepted as the Standard Book of the trade, and from which it was shown that the use of preservatives, in one form or another, was universal. Dr. Kenwood stated that he had performed some experiments on himself, and by the continuous use of boracic acid, set up a condition of health which he described as "Borism," and which he stated was a well-known disease amongst medical men. It was clearly shown, however, by Dr. Hutchinson that 999 out of every 1,000 medical men might be consulted, and they would not be able to give a description of a single case of "Borism," which was in fact, a word which originated in America and had no scientific basis, but was the result of a campaign in the United States which had been waged against the use of preservatives. It was also shown in the evidence that the argument as derived from American sources was clearly unreliable. With regard to the process of decomposition, which is set up in such mixtures as sausages,

much valuable information was forthcoming, and Dr. Klein described how he had conducted many experiments with sausages with a view to find out what quantities of preservatives would be necessary to preserve them in a perfectly hygienic state, without in any way impairing their value, and as a result of an elaborate system of controlled experiments, he arrived at the conclusion that the minimum quantity that could be used would be 26 grains of boracic acid per pound of sausages. As the manufacturers of sausages in the United Kingdom never use more than 35 grains per pound, or an equivalent of .5 per cent., it will be seen that they do not exceed this minimum to any great extent, and the opinion of the authoritative experts was that .5 per cent. was perfectly harmless.

Part of the evidence by Dr. Klein was that there is decomposition in sausages which manifests itself in smell, and there is decomposition which does not. These processes are produced by entirely different microbes; putrefactive changes are caused by the growth and multiplication of certain species of bacteria, which in their activity decompose certain substances contained in the meat, and at the same time, generate poisonous alkaloids and certain malodorous gases. According to the state of putrid decomposition you may have a smaller or larger quantity of chemical products which are poisonous. These chemical products are known generally as ptomaines. They have been analysed, and a large number of different ptomaines have been obtained, and these are entirely due to different kind of bacteria.

It was shown that the use of boracic acid in the quantities generally used throughout the sausage trade, namely, .5 per cent. was highly beneficial in inhibiting the growth of these bacteria, and so arresting this specific cause of decomposition. If the bacteria were inhibited from propagating, then it is quite clear that the chemical products would not be produced.

There was no evidence whatever to show that the use of boracic acid was in any way injurious to health, any more than salt or saltpetre, and that these three things were essential to the preservation of perishable foods.

In the result, the Recorder gave his judgment that when a person asks for a sausage, he knows that he gets an article in a state of preservation, and in so far as the extent of that preservation is concerned, is immaterial, so long as the sausage is sanitary and good to eat.

In so far as the medical evidence was concerned he was of opinion that a person who takes boracic acid as a medicine, does so under totally different conditions from the person who takes it in food, and that, therefore, the quantities named in the British Pharmacopœia do not apply. He therefore held that the prosecution had failed, and he sustained the appeal.

Such an important decision is of interest far beyond the town of Burnley, and the result will be read in many countries as putting a proper legal limit to the quantity of preservatives which may be safely used. It may, therefore, be laid down that in future, notwithstanding the prejudice which has been raised in connection with this matter, that it is permissible to use .5 per cent. of boracic acid in sausages and all similar foods, and any laws which may be enacted to the contrary are simply prejudicial to the public interest.

The case for the defence was in the hands of Messrs. Neve, Beck, & Kirby, of Lime Street, London, Mr. Bousfield being leading Counsel for the defence, and Mr. Sutton for the prosecution.



DEPARTMENT OF AGRICULTURE, ROYAL AGRICULTURAL SOCIETY'S SHOW,
Exhibits of Grasses, Grain, etc., from Hamed State Farm.

TRYPANOSOMIASIS AND OTHER DISEASES IN CAMELS, WITH EXPERIMENTS IN CONNECTION WITH THE FORMER.

By J. BURTON CLELAND, M.D., Ch. M. (Syd.), Government Bacteriologist and Pathologist, West Australia.

The animals the subject of this paper, to the number of 500, were imported by an individual in 1907 into the Northern part of West Australia and came from the neighbourhood of Karachi, in India. A veterinary certificate, stating that they had been inspected in India and were free from disease, is said to have accompanied them. India being a country where trypanosomiasis is common, not only in horses but in camels, it was considered advisable, notwithstanding their clean bill of health, to ascertain whether any blood parasites were present. Dr. Burton, then of Port Hedland, was asked to visit the place where the camels were quarantined 60 miles away, and take a blood smear from each camel and forward these slides to me for examination. After staining with Leishman, these were systematically looked through and, after examining 50 or 60 with negative results, two slides were found in rapid succession containing trypanosomes. Unfortunately, there were no means of identifying the camels infected by those trypanosomes, and further it was realised that mere blood slides were not sufficient to enable one to state positively that any particular camel in whose blood trypanosomes could not be seen was free from the disease. Accordingly, I was despatched to an inaccessible and barren part in the 20 deg. of S. latitude, 60 miles from Port Hedland, accompanied by Mr. Giles, F.E.S., as entomologist and assistant, to ascertain if the trypanosomes were those of surra or some allied disease, and if they were transmissible to horses, etc., and if so, to set in motion a systematic method for detecting the diseased animals so that they might be destroyed.

On arrival at the camel camp we at once set to work to find by means of blood slides an infected camel. After some fruitless search through 30 slides, one was at last detected (camel 11), and its blood inoculated into a dog. This animal showed trypanosomes on the 12th day. Further later experiments showed that the trypanosomes could be inoculated also into horses, guinea-pigs, and rats, producing in these animals feverish attacks and gradually signs of ill-health. Death, however, was postponed to a considerably later period than is usually the case with horse surra, the first dog to die taking 3½ months. Naturally, the horses could not be allowed to live long enough to die naturally from the disease on account of the danger from them. The trypanosomes, however, corresponded generally with those of *T. Evansi* (surra), and were undoubtedly pathogenic to horses and dogs. All the camels therefore had to be systematically examined, and the trypanosome ones weeded out. We carried out this weeding as follows:—Blood slides were taken from all the camels as follows:—

First blood examination, 479 camels, 3 with trypanosomes.

First blood examination, 355 camels, 4 with trypanosomes.

First blood examination, 70 camels, 0 with trypanosomes.

Accompanying the second and third of these, inoculations into dogs and sometimes into horses, was undertaken. Unfortunately, both were scarce, and it took a long time for them to reach the camp from Perth. We fell back, therefore, for economy's sake on the following method:—

A group of ten camels, sometimes less, sometimes a few more, was taken; the blood from each collected in citrate solution, and the mixture in several syringefuls as the blood was taken, injected subcutaneously into one dog. If this dog did not develop trypanosomiasis, the camels were supposed to be clean, but as an extra precaution, a second test of the group was made later into another dog. If the dog showed trypanosomes, we knew that one infected animal at least was present in this mob, and he had to be detected by blood slides, temperature-taking, or even, if necessary, individual inoculations into dogs, after which the remaining camels were re-tested.

I undertook personally the inoculations from 137 camels, detecting thereby three further trypanosome camels. Mr. Giles and Mr. Weir, the Chief Inspector of Stock, then continued the work, following the scheme outlined by me and brought it to a successful conclusion.

The following account of the disease as shown by different animals is followed by details of each infected camel and of the animals inoculated from it.

The Spontaneous Disease as Manifested in Camels.

Of the animals that came under my observation, some showed no signs of sickness and seemed in good condition, though not prime; others were distinctly poor, and those accustomed to camels did not hesitate to pronounce them sick. During the feverish attacks the animals were more inclined to lie down and ate less. There were no distinctive signs of disease, save perhaps in some cases a slight muco-purulent discharge from the corners of the eyes. After taking the temperatures of a large number of camels, a diurnal range of about 5 deg. F. was found to exist. For instance, at 7 a.m. temperatures of 94 and 95 deg. were often found. As the day wore on, these rose, and in the evening the average lay between 99 and 101 deg. (In the detailed account of the infected camels, this point had not then been noticed, and as no note had been made of the hour when the T. was taken, the records are not of much service in some cases). At 7 a.m., for instance, the T. of one camel (No. 95) was 99.4 deg., while several others were 94.2 to 96.1 deg. This indicated fever, and in the evening the T. was found to be 104 deg.

The highest T. reached in a trypanosome camel was 107.3 deg.; strange to say, no trypanosomes were seen at this time. The T. of another camel rose to 105.1 deg. when trypanosomes were numerous. As a rule trypanosomes could always be found when the T. showed a distinct rise. On the other hand, they were not infrequently found when the T. did not show a rise either on the day of the examination or on a day or so on either side. Usually, the trypanosomes became more numerous as the T. rose on successive days, and as it fell rapidly disappeared. Intervals when trypanosomes were absent varied from 10 to 12 days.

The post-mortem findings, which might be attributable to surra were not marked. The spleen showed usually slight enlargement and softness, the stomach showed no ulcerations, the intestines sometimes showed some congestion, and in one case the mesenteric glands showed decided enlargement and congestion; the blood in the internal jugular veins clotted almost im-

mediately; the bone marrow, in the only case examined, was yellow, but slightly blood-stained, and was not foetal.

In those animals which were killed during the period when trypanosomes could not be found in the peripheral circulation, blood films made from the liver, spleen, glands, etc., likewise showed absence of parasites. In the one killed when they were numerous in the peripheral circulation, the parasites were found in abundance in the bone marrow and viscera except in the spleen where they were strikingly absent.

The Inoculated Disease as manifested in Horses.

The incubation period after the inoculation of virulent blood varied from 6 to 16 days. The shorter incubation period occurred after injecting 6 c.c. of camel blood swarming with trypanosomes; in the longest, that of 16 days, the parasites were first found on this day, though, as a high rise of T. occurred on the 11th day, it is possible that they were then present in the peripheral circulation, but were overlooked. An incubation period of 11 days occurred in the case of a horse inoculated with about 5 c.c. blood from each of 14 camels, in the blood of none of which could parasites be detected at the time of the inoculation. As only one infected camel was found in this batch, we can infer that even so small a quantity as 5 c.c. of infected blood taken during an interval when trypanosomes were absent can develop the disease in horses after an incubation period of about a fortnight.

As the horse, in view of the dissemination of the disease by biting flies, was a dangerous animal to experiment with in virgin country, the horses to which the disease was transmitted were destroyed before the more pronounced signs and symptoms of surra had presented themselves. Horses in the N.W. are expensive items, and as the only point we wished to settle was the communicability of the disease to them rather than a complete clinical study of the disease till death ensues, the horses used were such as could be bought cheaply, and were practically unfit for other purposes of work, being mostly "pensioned" or poor in condition. The experiments proved conclusively the transmissibility of the infection to horses with recurring attacks of high pyrexia separated by apyretic intervals.

The following points were noted. The first symptom manifested was usually a decided rise in T., during which the blood showed at first few trypanosomes and in a day or so many. Occasionally stray trypanosomes appeared before the rise of T. This pyrexia lasted in the first period from two to four days, and with its fall the parasites disappeared. After intervals of a few days to a week or more, during which the T. remained low and trypanosomes could not be detected, further periods in which fever and parasites were present supervened, and these seemed to become closer approximated and longer.

Other signs had little time to manifest themselves, and were marked by the poor condition of the animals. An oedematous swelling of the sheath was seen but cannot be, at least entirely, attributed to surra, as other horses which had just arrived also showed it: it was probably due either to poor-ness and semi-starvation from feeding on spinifex-country or to the bites of flies. The same remarks apply to slight muco-purulent discharges from the eyes and, to some extent, to a hunched up appearance frequently shown. Emaciation must be attributed to the combined effects of the disease and the conditions of the country. During the attacks of severe pyrexia,

the aggravation of these symptoms, the listlessness, the staring coat, and the depressed appearance were attributable more directly to the infection.

Definite and pathognomonic *post-mortem* findings had likewise little time to develop. Emaciation was pronounced and there was a varying slight jaundiced tint. Oedematous fatty tissue was seen in places. The spleen was doubtfully a little large. Occasional slight ulcerations near the pylorus were probably attributable to worms. The bone marrow of the femur was reddish.

The Inoculated Disease as manifested in Dogs.

Small quantities, even 5 c.c. of infective blood in which trypanosomes could not be seen, were successful in transmitting the disease. The incubation period varied from nine days to about 14. Fever usually preceded by a day the appearance of the parasites. The highest T. reached was 105.8 deg. As in horses, periods of fever with trypanosomes in the peripheral blood alternated with apyretic intervals when they were absent.

The first dog to die was inoculated on August 7th, and died on November 21st—a period of 3½ months, which is decidedly longer than is usually the case in horse surra. Towards the end, the dog became gradually weaker and weaker, oedematous swellings appeared and paresis just before death. The spleen was much enlarged, and the organs were jaundiced.

Another dog inoculated on August 9th first began to show signs of disease beyond pyrexia in October. Definite parietic symptoms were present at times, and it became very low in condition and mopy. Oedema appeared at the end of November.

The Inoculated Disease as manifested in Guinea-pigs.

The disease was transmitted to two of these animals, the parasites being found on the 15th and 19th days respectively. No particular symptoms were noted in these cases. Three other guinea-pigs were inoculated from trypanosome camels; in two, no apparent effect was produced; in the other, though trypanosomes were never seen in its blood, it gradually sank and died in about six weeks with oedema, jaundice, ulcerated intestines, and a large soft spleen. This case is very interesting as doubtless infection resulted, and the parasite was probably present in some very minute form.

The Inoculated Disease as manifested in common Rats (mus alexandrinus).

Of four rats inoculated with blood from camels known to harbour trypanosomes, in only one was the disease transmitted, the parasites appearing in 15 days.

Experiments with Camels showing absence of Trypanosomes in blood films.

The blood for these experiments was obtained by making an incision into the end of the tail (with aseptic precautions), collecting in it sodium citrate dissolved in normal saline solution, and interjecting the mixture into the subcutaneous tissue. The amount of blood obtained varied from 8 drops to about 5 c.c.

Experiment No. 1—Dog Pug.—August 2nd: blood from camels 3, 36, 74, 103. No trypanosomes were seen in 10 examinations between August 2nd and 30th. The dog's temperature, however, reached 102 on the 10th day.

Experiment 2—Guinea-pig: blood from camels 8, 16, 30, 49. The blood was examined in August 12th and 16th with negative results, and the animal was found dead, apparently from extraneous causes, on the 18th.

Experiment 3—Guinea-pig.—August 14th: blood from camels 228, 297, 462. No trypanosomes were seen on 6 occasions between August 20th and September 3rd.

Experiment 4—Guinea-pig.—August 17: blood from camels 358, 365, 424. No trypanosomes were seen on five occasions between August 23rd and September 3rd.

Experiment 5—Rat No. 5.—August 19th: blood from camels 28, 45, 466. No trypanosomes were seen on occasions between August 26th and September 3rd.

*Examination of Parasitic Insects, etc., from the Trypanosome—
Infected Camels.*

Hippobosca Camelina (The Camel Fly).—On August 29th, a hippobosca was allowed to bite camel 106, when many trypanosomes were present in its blood. Half an-hour later, the insect was killed with chloroform. The head was severed with scissors and the mouth parts emulsified in water. Camel's blood cells were seen, but no trypanosomes. The same process was adopted with the abdominal contents and here, besides camel's blood cells, two trypanosomes were found.

Camel Lice.—On August 29th, lice were taken from camel 269 when trypanosomes were numerous. The contents of the intestines were squeezed out and stained. The preparation stained badly; however, camel's red corpuscles were seen, but no trypanosomes. There were, in places, numerous tick, slightly curved bacillary looking bodies, usually arranged in hieroglyphic-like figures.

Further lice were examined from this camel on the 11th September, when it was killed. In a blood film made before death, no trypanosomes could be seen. In the louse no trypanosomes were encountered, but the same bacillary forms as before.

Camel Tick.—On September 11th, when the three infected camels were shot, ticks were gathered and films made from the abdominal contents of a nearly full-grown female. In the anterior part, camel's red corpuscles were seen, but no trypanosomes; in the posterior part, the red cells had lost their shape.

Other Animal Parasites found in the imported Camels.

Hydatids (*Taenia echinococcus*).—In *post-mortem* on four of the camels, hydatid cysts were found in each. In one, there were about a dozen cysts, some as large as a goose's egg, in the lungs; in the other three there were up to half a-dozen, ranging to the size of a hen's egg. Single cysts were found in the livers of two. Two of the cysts were degenerating and becoming calcified. In one, a large number of daughter-cysts about the size of a grain of sago were present. In some, brood capsules were conspicuous. Scoleces were numerous, and also the rounded concentric bodies like starch grains.

Considering the number of cysts present and the fact that two were degenerating, it hardly seems possible that the camels can have gained the infection in Western Australia during a stay of five months, especially as, in

the only two bullocks I have seen slaughtered here, the liver and lungs were unaffected and stockmen here are not apparently aware of the presence of hydatids in this part.

Worm-nests (Spiroptera (?) Nodules).—These were present in two of the infected camels. In one, they were numerous in the only two situations examined, namely in the subcutaneous tissue of the neck and under the tail, forming firm little masses up to the size of almonds. On the other camel only two or three were present. These could be felt and seen from the outside as rounded masses, more or less adherent to the skin. In fact, one of these was, during life, mistaken for an enlarged lymph gland: a needle was inserted but nothing withdrawn; next day there was a good deal of swelling round about the lump evidently due to the liberation of some poison by the worms. The small round worms were embedded in a dense fibrous stroma.

Filarial Embryos in the Blood.—During the examination of blood films for trypanosomes, filarial embryos were found in nine camels (Nos. 9, 21, 118, 199, 208, 298, 308, 325, and 340).

Camel Bots.—In the four *post-mortems* numerous bots were found in each instance in the naso-pharynx.

No. 1.

Infected Camels.

Camel No. 11.—On August 2nd trypanosomes were found in the blood of this animal. About the 30th camel examined; one parasite was found after five minutes' search, a second five minutes later, and a third two minutes later. The animal seemed in fair condition and did not look ill. Several c.c. of blood were collected in citrate solution by incision into the tail with septic precautions. Most of this was injected into dog 1, the remainder into guinea-pig 1.

The dog developed fever (T. 103.3) on the 10th day, a single trypanosome was seen on the 12th day, and a second on the next. On the 14th day the temperature fell but rose again to 104deg. on the 15th day, when trypanosomes were easily seen. No trypanosomes were found between the 22nd and 24th days. One was seen on the 25th day, and they were easily found on the 28th.

Guinea-pig 1.—No trypanosomes were seen on eight occasions during the first month.

August 15th.—T. 101.

August 16th.—T. 98.8. Trypanosomes were numerous; easily found.

August 17th.—T. 100.2.

August 19th.—T. 100. No trypanosomes found in 5 mins. search.

August 20th.—T. 107.3.

August 21st.—T. 98. No trypanosomes seen.

August 23rd.—T. 95.7.

August 24th.—T. 97.5.

August 26th.—T. 99.2.

August 27th.—T. 100.8.

August 28th.—T. 98.

August 29th.—T. 94.5.

August 30th. Trypanosomes easily found, but most of them very thick.

August 31st.—T. 96.5.

Sept. 1st.—T. 96.8.

Sept. 2nd.—T. 96.6.

Sept. 3rd.—T. 97.2.

Sept. 4th.—T. 96.1.

Sept. 5th.—T. 94.6.

Sept. 6th.—T. 96.2.

Sept. 11th.—No trypanosomes seen in blood; general circulation good.
Shot on this date.

Post-mortem.—Spleen slightly large and soft. Liver and kidneys seem normal. No erosions of stomach; some congestion of intestines; mesenteric glands considerably enlarged, and some very congested blood in jugular vein clotted almost immediately.

One hydatid, size of hen's egg, in the liver, and several smaller ones in the lungs. No worm nests seen in subcutaneous tissue. Numerous large bots in naso-pharynx.

Films from liver and mesenteric glands showed no trypanosomes.

A paraffin section of the mesenteric gland stained with Leishman showed that it was much infiltrated with eosinophile cells. There was an extravasation of blood in one part. The germ centres were distinct. No trypanosome-like bodies seen.

No. 2.

Camel 269.—On August 5th, this camel was found harbouring trypanosomes. Two were found in two minutes search, but a third took fifteen minutes to find.

On August 7th, several c.c. of blood were collected in citrate solution from the tail, and inoculated into—

- (a) Dog 2;
- (b) Guinea-pig 2;
- (c) Rats 1 and 2.

Dog 2 developed trypanosomes and fever on the 12th day. Though fever continued for two days the parasites were not seen again till the 20th day, when the T. was 101.9, next day it was 105.1.

In guinea-pig 2, trypanosomes were first found on the 15th day.

No trypanosomes were seen in the rats.

August 7th.—Camel's T. 100.

August 15th.—Camel's T. 104.

August 16th.—Camel's T. 105.1. The animal seemed very sick.

Trypanosomes were very numerous. On this date blood was taken directly from the abdominal vein, collected in citrate solution, and injected into—

- (d) Horse 1. Trypanosomes numerous on fifth day.
- (e) Dog 4. First trypanosome seen on 8th day.
- (f) Guinea-pig 4. Trypanosomes not seen.
- (g) Rat No. 4. Trypanosomes not seen.

August 17th.—T. 103.7.

August 19th.—T. 95. No trypanosomes seen after 7 minutes' search.

August 20th.—T. 95.7.

August 21st.—T. 97.3. No trypanosomes seen.

August 23rd.—T. 95.6. " "

August 24th.—T. 97.2. " "

August 26th.—T. 99.7. Trypanosomes moderately numerous; often two in a field.

August 27th.—T. 101. Often 5 or 6 trypanosomes in a field.

August 28th.—T. 102.2. Up to 8 in a field.

August 29th.—T. 100.6. Up to 8 in a field.

August 30th.—T. 98.6. Trypanosomes less numerous.

August 31st.—T. 97.3.

Sept. 1st.—T. 97.5. Camel looks better.

Sept. 2nd.—T. 96.8.

Sept. 3rd.—T. 95.5.

Sept. 4th.—T. 95.4.

Sept. 5th.—T. 95.2.

Sept. 6th.—T. 96.

Sept. 11th. No trypanosomes seen in peripheral blood. Camel shot.

Post-mortem.—Spleen large and soft. Liver and kidneys nothing special. No erosions or ulcers seen in stomach or intestines. Submaxillary salivary glands normal.

Numerous hydatid cysts to size of goose-egg in lungs. "Worm-nests" up to size of almonds in subcutaneous tissue of neck and under tail. Thin nematodes in bronchial tubes. Numerous bots in naso-pharynx. Lice. Ticks.

Films from the liver, spleen, and submaxillary gland showed no trypanosomes.

In the body of a louse and a tick camel's red cells were seen but no trypanosomes. In the louse peculiar large, somewhat wavy bacillary bodies were seen. The following sections were stained with iron hæmat-oxyl, eosin, azure, etc. Submaxillary gland, nothing special. Liver, intercellular capillaries distended with blood, pigment in liver cells, no bodies seen like trypanosomes. Spleen: much blood in sinuses; blood pigment present; nothing identifiable as trypanosomes or their nuclei.

No. 3.

Camel 106.—Cow. During the routine examination, trypanosomes were found in this animal, requiring about a minute's search to find them. The camel seemed a little sick. On August 9th it was tied down and blood was taken directly from the abdominal vein and 4 or 5 c.c. injected into Dog No. 4, 102 c.c. into guinea pig No. 3, and about the same into Rat No. 3.

Dog 4.—Trypanosomes were first seen on the 10th day, and were numerous on the 12th.

Guinea-pig No. 3.—Trypanosomes numerous on 19th day. Died in 3½ months.

Rat No. 3.—Trypanosomes were first seen on the 17th day.

August 15th.—T. 102.

August 16th.—T. 98.8. Trypanosomes easily found.

August 17th.—T. 100.2.

August 19th.—Slipped about a four months' calf. No trypanosomes were found in the calf; there were a few nucleated red cells.

August 20th.—T. 97.

August 21st.—T. 97. No trypanosomes seen.

August 23rd.—T. 95.4. " "

August 24th.—T. 97.8. " " A needle was inserted into two small, firm nodules, one in the neck, one behind the ear, supposed at the time to be enlarged lymphatic glands; in post-mortem, however, they turned out to be worm-nests. Very little fluid was obtained, and in this no trypanosomes could be found. Next day there was considerable swelling around the nodule in the neck, evidently due to the liberation of toxin by the injured worms.

August 25th.—T. 99.3. Trypanosomes moderately numerous; sometimes 2 in a field.

August 27th.—T. 97.2. Ditto.

August 28th.—T. 101.5. Up to 4 trypanosomes per field.

August 29th.—T. 102.5. Ditto. A needle was again inserted into the nodule, but nothing was obtained.

August 30th.—T. 100.5. No trypanosomes seen.

Sept. 1st.—T. 97.3.

Sept. 2nd.—T. 96.

Sept. 3rd.—T. 94.5.

Sept. 4th.—T. 95.8.

Sept. 5th.—T. 96.8.

Sept. 6th.—T. 96.4.

Sept. 11th.—One trypanosome found in 10 minutes' search. Camel shot.

Post-mortem.—Condition poor. Liver, spleen, and kidneys about normal. No erosions in stomach. Intestines considerably congested. Blood in jugular vein clotted almost immediately.

A calcifying hydatid in the liver; several moderately-sized hydatids in the lungs. Several worm nodules in subcutaneous tissue of neck just under skin. Numerous bots in naso-pharynx. Films from liver and spleen showed no trypanosomes.

No. 4.

Camel 255.—On September 17th, during the second blood examination, this animal was found to harbour trypanosomes, sometimes two in a field. It was poor in condition and looked out of health. Smears were made from the body contents of a nearly mature female tick, and also from a male found upon it, but no trypanosomes or suggestive bodies were found in these.

Sept. 18th.—T. 100.1. No trypanosomes seen.

Sept. 20th.—T. 98.2. " "

Sept. 21st.—Trypanosomes present; not numerous.

Sept. 22nd.—T. 95.4. Trypanosomes fairly numerous.

Sept. 23rd.—Trypanosomes numerous; several in a field. Shot on this date.

Post-mortem.—Thin; very little fat. Slight increase of fluid in peritoneum. One small hydatid in liver. Spleen about normal. Kidneys normal. Stomach: no alteration. Small intestines: apparent slight congestion. Heart pale and flabby; no petechiae. Lungs normal. Bone-marrow yellow, slightly blood-tinged in places, not foetal.

Smears and films were made as follows:—Blood, trypanosomes numerous. Liver, easily found. Spleen, none seen. Lungs, trypanosomes very numerous, many apparently degenerated; a filaria seen. Bone-marrow, trypanosomes numerous: many large and with clear spaces, others with irregular nuclear and centrosome masses; two seen end to end by their centrosomes.

No. 5.

Camel 283.—Found to harbour trypanosomes (numerous) on September 27th, during the second blood examination; T. 100. One of the poorest 25 camels in a mob of 270. Condition poor, but not very poor.

Sept. 28th.—T. 103. Trypanosomes very numerous, up to 15 in a field.

Sept. 29th.—T. 104.8. Not quite so numerous.

Oct. 2nd.—T. 95.6. No trypanosomes seen.

Oct. 3rd.—T. 98.5. " "

Oct. 4th.—T. 99.2. " "

Oct. 5th.—T. 98.6. " "

Oct. 6th.—T. 96.7. " "

Oct. 7th.—T. 96.8. " "

Oct. 8th.—T. 97.5. " "

Oct. 9th.—T. 99.8. Trypanosomes easily found, some apparently dividing.

Oct. 10th.—T. 102.2. Ditto.

Oct. 11th.—T. 100. No trypanosomes seen.

Oct. 12th.—T. 99.2.

No. 6.

Camel 300—Found on October 1st, during second blood examination, to show fairly numerous trypanosomes.

Oct. 3rd.—T. 104. 1 or 2 trypanosomes per field.

Oct. 4th.—T. 98.8. No trypanosomes seen.

Oct. 5th.—T. 98.8. " "

Oct. 6th.—T. 96.1. " "

Oct. 7th.—T. 96.6. " "

Oct. 8th.—T. 97. " "

Oct. 9th.—T. 95.8. " "

Oct. 10th.—T. 97.2. " "

Oct. 11th.—T. 98. " "

Oct. 12th.—T. 98.4.

Oct. 14th.—Two small degenerate trypanosomes.

Nov. 12th.—T. 104.5. Otherwise through November normal.

Dec. 12th.—Destroyed. Scarcely any trypanosomes visible for days past, and none to-day. *Post-mortem*: The only thing of note was a slight jaundiced tint of small intestine.

No. 7.

Camel 132.—This camel was one of series 10 (Camels 127-137) infected into Dog 7 (Forty-two Sheep Dog) on September 28th. The dog developed

[By courtesy of *Western Mail*.



Champion Merino Ram (Strong Wool), property of Mr. H. J. Lukin (Royal Agricultural Show).

trypanosomes on October 11th, and constant search, by temperature taking and blood smears, failed for long to detect the infected camel.

Nov. 12th.—T. 101.2. No trypanosomes.

Nov. 13th.—T. 104.5. Trypanosomes numerous.

Nov. 14th.—T. 100.8. At 6.30 a.m., no trypanosomes.

Dec. 12th.—Destroyed. Lungs slightly congested, rather dark. Liver: hydatids; golden tint from jaundice. Heart normal. Spleen much enlarged and discoloured. Small intestine discoloured, apparently slight enteritis, no ulceration. Large intestine normal. Flesh very dark in colour, watery and flabby.

(To be continued.)

WHEAT EXHIBITS AND JUDGING BY POINTS.

Mr. Geo. L. Sutton, Wheat Experimentalist, gives the following remarks relative to the classes for wheat exhibits at shows and judging by points:—

Wheat Exhibits at Shows.

The majority of agricultural societies are actuated by a desire to so arrange their schedules that the prizes offered shall have the effect of directly encouraging the adoption of better methods in the different sections of agricultural practice. With some classes the results have been very satisfactory, but in others quite as unsatisfactory, *e.g.*, the majority of those classes arranged for the encouragement of good farming in the wheat districts.

The general practice to encourage the best methods in connection with wheat growing is to offer a prize for the best sample (generally a bag) of wheat. Such exhibits have a certain value at country shows, more especially when the classes for them are open ones and are properly included in the schedule, but their influence is not in the direction intended. They show the quality of wheat the various districts represented are capable of producing, when it is cleaned under the best conditions, which often include laborious hand-picking, and which is quite in order. The exhibition of a bag of grain should not be hampered by any restrictive conditions regarding cleaning or winnowing; the very nature of the class, which is a competition for "the best bag of wheat," implies that a miller's sample is required, and as wheat for the miller cannot be cleaned too well, any restrictive conditions are out of place, and the most thorough methods are permissible. At a miller's, or at a metropolitan exhibition, when supplementing a class for growing crops,

such classes are of great interest and of considerable educational value, but their influence for the improvement of methods of farming is very small.

These classes, rather than encouraging good farming methods, mainly, though indirectly, encourage the manufacture of superior types of cleaning and grading machinery, which in its place is a most desirable thing to encourage, but in this instance is not achieving the object aimed at, viz., the encouragement of good farming methods.

The production of a fine sample depends rather upon the cleaning machinery a farmer possesses, than upon his ability to farm well. With good machinery a splendid sample can be produced from a crop grown by indifferent and slovenly methods.

With the object of inducing farmers to adopt better methods, at least one society has insisted upon the sample for exhibition being taken directly from the harvesting machinery in the paddock, and placed under seal until judging takes place at the annual show. This practice, whilst it is an advance upon the usual one, in that it ensures samples being taken under field conditions, is also defective, in that it is still obviously an indirect encouragement to the machinery manufacturer rather than a direct one to the farmer. In addition, this plan (if the farmer is influenced by the desire to win the prize, as it is intended that he should be) may unintentionally encourage a practice that is not commercially good. The prime object of harvesting is to secure all the grain produced, and to do this it is sometimes necessary to so adjust the harvesting machinery that it does not clean it as thoroughly as it is capable of doing, therefore under some conditions the production of an inferior show sample, i.e., marketable grain with chaff amongst it, may be an indication of good, i.e., profitable farming.

Some may think that the farmer should reclean his wheat thoroughly before selling it, but from a commercial standpoint it is questionable whether, under present conditions, it will pay a farmer to reclean his wheat after it has left the harvesting machine. It is probable that it will suit him better to accept a correspondingly lower price for his product than to install machinery to reclean it. In any case it will only be very large farmers who will ever find it profitable to install machinery sufficiently large to clean it in an economical manner, or as cheaply as it can be done by the millers.

From a farmer's standpoint the practice of offering a prize for the best bag of wheat, irrespective of any other condition, is objectionable in another way, for, as the most showy and attractive varieties are, sometimes, very poor yielders, it may prove an encouragement to the growth of unprofitable varieties.

Judging Standing Crops.

The real test of good farming is the production of good crops of varieties which have satisfactory characteristics. Good farming can, therefore, be encouraged by offering premiums for the best and cleanest crops, which shall be judged as they are standing, and the relative value of which shall be determined chiefly by their ability to yield well. I am sure that many societies have realised the necessity of encouraging the practice of better methods in this way; but few, very few, have attempted to do so, because of the difficulties surrounding the judging of such a class. The difficulties

[By courtesy of *Western Mail*.



Champion Lincoln Ram, property of Mr. H. J. Lukin (Royal Agricultural Show).

in this connection are great, but are not insurmountable, as is shown by the few cases in which classes of this character have been successfully judged.

From the nature of such a competition most of the competing crops will be widely separated, and can therefore be judged only by a pre-determined scale of points, which takes into consideration the factors that are indicative of good farming, and also such characteristics of the plant as make it a satisfactory and desirable variety in the field.

The time for judging growing crops will shortly be here; with the object of assisting those societies who have already initiated this class of competition, and also those who feel disposed to initiate it, the following scale of points for judging standing crops, drawn up by the late W. Farrer, in 1904, is submitted.

Scale of Points for Judging Standing Crops of Wheat.

(The crops to be judged when quite ripe.)

Qualities of Merit.	Maximum points.	Remarks.
Yield	25	The yield to be determined by harvesting a portion of the crop, at least $\frac{1}{5}$ acre in area. The winnowed grain after the unmerchantable small grain has been rejected, to be weighed, and from this the yield per acre is to be computed.
Quality of sowing as indicated by evenness of stand	9	.....
Purity	6	Freedom from admixture of plants or other varieties.
Cleanness of crop	9	Freedom from wild oats, weeds, etc.
Healthiness of crop	9	Freedom from rust, smut, take-all, etc.
Ability of the heads to hold grain	9	It is necessary for the crop to be ripe to determine this.
Ability of the heads to protect the grain from rain	5	.....
Ease of thrashing	5	.....
Attractive habit of growth ...	4	.....
Suitability of harvesting by machinery	6	.....
Strength of straw	10	Freedom from brittleness, with ability to carry well-filled heads. The crop must be ripe to determine this.
Scantiness of flag	3	Freedom from excessive leafiness.

So that the society at its annual show may derive some benefit from this class, a necessary feature of it should be a condition providing that a bag of the grain be exhibited at the show following the competition, and in order that the most might be made of the educational value of such a class, the bag exhibited should have details as to variety, yield, and the points awarded to the growing crop, affixed to it.

Judging Grain by Points.

Some agricultural societies are adopting the plan of judging by points. As this practice is likely to increase, the following scale of points for judg-

ing samples of wheat grain is given for the guidance of those who are interested in this phase of judging:—

Qualities of Merit.			Maximum points.	Remarks.
Weight per bushel	...	...	30	This carries with it plumpness, and a large proportion of those qualities which millers value most.
Brightness	...	...	10	A characteristic of high quality.
Translucency	...	...	20	The grain when cut across should be horny and hard, rather than soft and starchy.
Purity of sample	...	...	5	Freedom from grains of other varieties.
Cleanness	...	...	10	Freedom from weeds, seeds, smut, chaff, broken and damaged grains, rubbish, etc.
Uniformity	...	...	10	Size, colour, brightness, and general appearance.
Size of grain	...	...	5	Smooth, not angular.
Shape of grain—				
Crease	...	4	10	{ Should be shallow, rounded, and Should be small. Should be small and not prominent.
Brush	...	3		
Germ	...	3		

Exhibits which are badly smutted, mouldy, musty, or contain a palpable admixture of varieties, should be disqualified.

MILK FOR CONSUMPTION.

Speaking on this question Mr. Kinsella gave some advice to producers and vendors at the Royal Show. During the course of his remarks, while giving a practical demonstration with an improved milk strainer and filter, and also with a special spiral coil milk-cooler, he stated that a great deal had been written of late regarding the condition of our present system of city milk production and delivery, but little advice had been offered to the producer by the critics. "It is an easy matter to find fault," said Mr. Kinsella, "but it is not always so easy to suggest a sound and workable remedy which will overcome the difficulties. I am not a gazetted officer under the Health Act, but I am sure a few practical hints to the producers will not be taken exception to. I would like all of our dairymen in the metropolitan district to take home with them a copy of the little bulletin on the care and treatment of milk, which I am handing out here to-day, and to carefully read it. I have heard many complaints regarding what is termed "rank flavours" in milk and in butter. It may be well for me to here explain that there are two distinct flavours which milk is subject to. There are food and contamination flavours. Those flavours of different foods and weeds which cows eat, and which the milk absorbs from the animal before the milk is drawn from the

cow's udder, are known as food flavours, and are always more pronounced at the time of milking. Those food flavours cannot always be entirely eliminated from the milk, but they can be greatly minimised by judicious feeding and by proper aeration and cooling of the milk, exactly on the lines which I have just demonstrated to you. I may add that there are two kinds of food flavours; the second is due to flavours of certain substances (strong smelling) which are absorbed by the milk after it has been drawn from the cow, that is by allowing the milk or cream to stand in a place where onions, turnips, and the like are stored. This latter I may term as a food flavour due to absorption. The flavours known as contamination flavours are the most dangerous to the public health, and are due to the milk being directly infected with bacteria at some period after the milk has been drawn from the cow. These flavours are absolutely under the control of the milk producer. The remedy is spelled "cleanliness." Now, to be brief, if it is not found possible to get rid of rank or weedy flavours in milk and butter by the treatment which I have described, the only other absolutely sure way is to pasteurise the milk.

REMEDIAL MEASURES.

I reckon if dairymen would pay close attention to the following points they would benefit greatly by them:—

1. Pay more attention to the time of feeding, and, if strong-flavoured foods, are fed, they should be given in conjunction with some other fodder, such as maize, barley, lucerne, or clean straw.

2. If turnips are fed to milch cows, they should be topped and tailed and fed as above described. Turnips, rape, etc., when given to milch cows should always be fed after milking.

3. When turnip tops, rape, and other very strong-flavoured foods are fed injudiciously, it is impossible to make from the milk a first-class article of butter, even if pasteurisation is resorted to.

4. When carrots and beets are fed, they should be given in the proportion of about one bushel per cow per day; for a heavy milker this is right, and added to that should be at least 5lbs. of corn, bran, and oilcake. Cows which furnish milk for infants should only be given them in the proportion of half a bushel, and turnips, rutabaga, and turnip tops should be excluded. Cows which furnish milk for infants should not be fed with oilcake, cottonseed meal, or other substances containing large percentages of oily or fatty matter. The use of distillery refuse should not be permitted.

5. The milking should be carried out with the greatest care and cleanliness as near as possible under the following conditions:—The milker should wear a special costume, and be provided with a towel in case it should be necessary to wash his hands. During the milking the byre should be properly lighted, especially behind the cow, so that the milker may see to do his work with care and cleanliness. Immediately after the milking the milk should be passed through a metal sieve or strainer covered with a fine cloth or cotton wool. The Ulax strainer is an excellent type of milk purifier. The milk should then, whatever the season, be passed through a refrigerator or approved milk cooler to lower the temperature to 60 deg. or below, at which it should be maintained until its despatch. The manure should be removed in the morning after the milking, and in the afternoon at least one hour before

the evening milking. The milk of cows just entering on the period of lactation, and that of cows declared diseased, should be collected separately, so that it cannot get mixed or mistaken for the normal milk destined for use in the city.

These few practical hints, if given effect to would, I am sure, result in a cleaner milk supply. Too much stress cannot be laid on the importance of properly washing and sterilising all milk utensils.

PASTEURISATION.

I am a thorough believer in pasteurisation as a temporary remedy for securing a milk free from disease germs. I have always been a strong advocate of getting at the root of the trouble by practical instruction, inspection, or in other words, educating the dairy farmer at the cow byre, but this is hardly possible in a new country like this. It will require years before we can reach such a state of perfection in this direction as exists in Denmark or other older dairying countries. In the meantime, the public health of our cities and towns must suffer, more particularly the health of our young children. I am not now talking what is sometimes termed "wild and scare statements." I am giving you hard, honest facts, and the sooner the public wake up to the necessity for a cleaner milk supply, the better for all concerned. Getting back to the practical part of pasteurisation, I am of the opinion that we shall never get a pure milk supply in our cities until some such system is adopted as that which is carried out in Glasgow. This, to my mind, is the finest system of city milk control in the world. Briefly, the whole of the milk for human consumption is under municipal control. It is all required to pass through what is called a clearance depot, where it is inspected, graded, pasteurised, and cooled before being despatched to the city customers. The nearest approach to a perfect milk supply after Glasgow that I have seen is carried out in Copenhagen, in Denmark, where large private companies control the bulk of the city milk trade. Here, again, the milk is all collected to one centre and dealt with almost in the same manner as is done in Glasgow. The dairy regulations controlling the milk supply of these large companies in Denmark are a masterpiece of practical information and advice to the dairyman along the lines of feeding and cleanliness.

The process of pasteurisation may be said to have passed the experimental stage, therefore it should not be necessary to bring forward any evidence to show the correctness of the principles involved. Other leading dairying countries have settled the question long ago, and the very fact of their adhering to the system is in itself a sufficient guarantee of the value of pasteurisation.

It is well known that the pasteurising of milk has some effect on the albumen of the milk, but to say that the quality as a foodstuff would be seriously impaired cannot be substantiated. The very fact of pasteurised milk being used at the hospitals for sick children in Great Britain is a sufficient guarantee that little or no injury is caused to the milk. Milk of this kind is used for sick children in Great Almond Street, London, and a similar procedure is adopted in the York infants' milk depot, and many other institutions of a like nature, with the sanction of some of the most eminent scientists.

At temperatures above 160deg. bacteria do not grow well. Very few thrive above 125deg., and the higher the temperature is raised the more bac-

teria perish. Heating milk to a boiling-point or thereabout always imparts a boiled flavour; but it is possible to reduce this so as to be almost imperceptible by heating to only 158deg. Experiments have proved that if milk or cream is kept at 158deg. for ten minutes most of the bacteria will be killed. Cream may be heated to 165deg., if quickly cooled afterwards, without developing a boiled flavour. Some species of bacteria are not destroyed even by heating the milk to 212deg. or 215deg. That being so, it seems useless to attempt to overcome the prejudice against the so-called boiled or cooked flavour, when a sure safeguard against the most common dangers can be secured by heating to between 158deg. and 165deg. In other words the worst flavour-producing germs are destroyed at the latter temperatures. It has been proved that raising the temperature of the cream rapidly to 158deg., and keeping it at this point for two to five minutes, then immediately chilling it to 65deg., or below, will destroy nearly all forms of bacterial life. But although heating to 158deg., or even boiling-point, kills most of the bacteria, it does not destroy their spores; hence, if the milk or cream is held at a favourable temperature—between 80deg. and 100deg.—for any length of time, these spores will develop and the battle begin anew. The cooling should be done rapidly, especially between 120deg. and 65deg.

Milk as it comes from a healthy cow fed on pure food is absolutely pure and sterile, and if it can be so secured in a sterilised, air-tight bottle it will keep for an indefinite period. From a practical butter and cheese-making standpoint, it is utterly impossible to secure milk at the factory in a sterile condition. Millions of germs (bacteria) are floating in the air, in the dust of the roads, and in the water, and are contained in the dirt that adheres to the cow's udder and flanks, and to the hands and clothing of the milker. It is true that pasteurisation will not improve the flavour of first-class milk or cream, also that taints imparted by onions, turnips, rape, etc., if very strong in the milk, cannot be wholly removed.

In my earlier experiences of pasteurisation we employed much higher temperatures than we do at the present time. These high temperatures considerably altered the constituents of the milk and made it harder to digest. Late experiments, however, prove that by heating to a lower temperature and maintaining it for a time destroys all germ life, without altering the constituents. Bearing on this point, I beg to quote from late experiments conducted by one of our ablest British scientists, Dr. H. Droop Richmond, of London. He says:—"The limit which has been used in pasteurising was an exposure at 155deg. F. for a period of about twenty minutes, this being the highest temperature which could be used without imparting a permanently cooked taste to the milk. With the use of this maximum temperature a minimum period of exposure was secured. But under these conditions, the consistency of the product and the creaming property of the milk were greatly reduced, two serious objections from a practical point of view. Methods were devised which enabled the restoration of the consistency or 'body' of heated cream, so that this objection was largely overcome. In order to study the practical effect of pasteurising at lower temperatures, experiments were conducted as to the completeness of creaming of the milk at 140deg. and 155 deg. F. At 155deg. F. the amount of cream observed on bottles of milk was always less than that which collected on normal milk, and the cream line was also indefinite unless held for two days. The milk heated at 140deg. F. for periods of from 15 to 60 minutes showed a rapidly formed cream line,

and as thick a layer as on the unheated milk. As to keeping quality: In tests where the raw milk soured in about two days at 50deg. F., the pasteurised samples kept for at least six days, and there was practically no difference in the keeping quality of the two lots. These practical tests demonstrated that milk heated to a temperature of 140deg. F. possessed all the advantages that were secured by the use of a higher degree of heat, and at the same time the disadvantages of higher heating were overcome. A bacteriological study was also made of these milks. The destruction of germ life was first evident at 140deg. F., 98.9 to 99.8 per cent. of all bacterial life being destroyed. An exposure of higher temperatures resulted in a slightly greater destruction of bacteria, but this slight increase in efficiency was not warrantable at the expense of the creaming property or consistency."

Time will not permit of my going fully into the whole process of practical pasteurisation. My object is to bring home to both the consumer and milk producer the importance of some radical change taking place in the direction of improvement in our milk supply.

CHAPMAN STATE FARM.

The Under Secretary, Mr. A. Despeissis, recently visited the State Experimental Farm at the Chapman, Geraldton district, and gives a very satisfactory report of its progress.

This year 200 acres of land are being cleared, bringing the total area fit for cultivation up to 700 acres. About 120 acres are under wheat for the grain yield, of which between 10 and 12 varieties are being experimented with. The crop is well forward, and is expected to yield about four bags to the acre. There are about 30 acres of barley, which, despite the dry season, will give from 25 to 30 bushels to the acre. Besides this there is another 20 odd acres to be cut for hay, and a stack silo is being built with a capacity of about 40 tons. For sowing next year there are at present 293 acres of fallow land.

One of the interesting features of the farm is an experiment which is being made in the growth of sisal hemp for fibre. This is one of the best varieties of producing aloe, and its fibre is worth £24 per ton. The Department of Agriculture secured the plants from Queensland, where the hemp has been grown with considerable success, and on the Chapman farm there are now two acres planted. The hemp required no cultivation, the ground simply being ploughed in strips at intervals of from nine feet to ten feet, and suckers of off-sets being planted in lines about six feet apart. It is not found necessary to cultivate the intervening spaces, which, when the plants are strong enough can be used for grazing purposes. The hemp is a perennial, and yields six or seven crops before it flowers, the yield in the fourth year being, it is estimated, about 10cwt. to the acre. The plants were secured in August,

[By courtesy of *Western Mail*.



Champion Lincoln Ewe, property of Mr. H. J. Lukin (Royal Agri. Show).

and have only recently been planted, but a great many of them have started growing vigorously. It is intended to use this small plantation as a nursery, whence suckers can be procured by settlers.

In regard to the stock on the farm, Mr. Despeissis states that the surplus was sold off last year, and the Department then secured a number of high quality crossbred ewes for breeding lambs for export. The lambing this season was most successful, reaching 90 per cent., and the progeny of the ewes are all strong lambs, suitable for export. In addition, the ewes averaged 7lbs. of wool, the bellies and locks not being included in this. Some of the sheep, which were not nursing lambs, cut from 12lbs. to 13lbs. of wool. During the visit of Mr. Despeissis, fine rains were experienced, and were of great benefit to the crops.

POULTRY NOTES.

By FRANK H. ROBERTSON.

About Disease in Poultry.

Fowls are subject to a great variety of complaints. They are possessed of the usual organs of respiration, digestion, generation; have a liver, heart, spleen, lungs, and many other parts, any one of which may become so diseased as to cause death and it is impossible to accurately diagnose the particular form of ailment unless supplied with minute details, perhaps too much to ask for. The surest method of determining matters of this sort is by *post-mortem* examination; and here I will inform my readers that this Department is willing to assist poultry-keepers in combatting any outbreaks of disease which may occur in yards in any part of the State. The best plan is to forward to me the body of a dead bird as soon as possible after death, and a careful examination will be made free of cost; and if necessary bacteriological tests will be undertaken. By this means it will be able to determine the immediate cause of death, and if fuller particulars are also supplied as to the nature of general surroundings, feeding, housing, etc., a correct diagnosis of the trouble and how to overcome it can be supplied to the poultry farmer.

Very unsuitable ingredients are often given to ailing fowls by persons who do not take any pains to find out what the birds are suffering from, but give the first thing that comes to hand. Cures are sometimes made, but more frequently death is accelerated. To go fully into the diseases of poultry is too lengthy a subject to be dealt with in a summary manner. One of the best works on the subject contains about 250 pages of printed matter and illustrations, and deals with about 180 different complaints.

Under the heading of Diseases of the Organs of Urination and Reproduction alone may be described more than 20 different ailments. From this it will be seen that owing to the great variety of diseases, the haphazard method of applying remedies must be frequently very wide of efficiency. Many ailments are too obscure to diagnose in life, and can only be ascertained by post-mortem examination. Still as many are easily recognisable at any time, I will mention some of them.

If fowls have apparent difficulty in breathing, catch them at once and carefully examine the larynx (or entrance to the trachea or windpipe) for diphtheric growths, and remove same with a small forceps or blunt piece of wood. If this is not done promptly the growths soon fill up the entrance and the bird chokes. If there are no growths to be seen, then the trouble is located in the lungs or bronchial tubes.

With fowls going weak on the legs, causing squatting, accompanied by diarrhoea, tick can be suspected, therefore take a thin-bladed table knife and make a careful examination by inserting the blade into the woodwork of the fowl-house and perches to ascertain if the pest is present. It may be also necessary to examine the fowl. If no tick are to be found, it may be simple diarrhoea owing to improper feeding. As the fowls get badly infected, thirst increases and there is no appetite, in which case do not force food down a bird's throat, other than nourishing, easily digested food, such as beaten-up egg to keep up the strength while under medical treatment; but if there is already food remaining in the crop it is useless to give any food until it is empty. Diarrhoea is also one of the symptoms of other complaints. Roup is easily recognised by bad smelling discharges from the nostrils, frequently accompanied by growths in the mouth and swollen eyes.

Fowls found suddenly dead without apparent cause: With fat hens it is frequently due to the rupture of a partially-formed egg causing peritonitis, or from intense straining. Apoplexy is another cause of sudden death.

Liver complaints: Birds are dull and pale in comb, billious appearance about the eyes, yellowish evacuations. Worms are of frequent occurrence in the intestines of fowls, and are only diagnosed by *post-mortem* examination. Diseases of the heart and kidneys are difficult to determine except by *post-mortem* examination. Lameness is most frequently found where the fowls have only the run of hard gravelly land, causing corns, which in many cases turns into bumble-foot. Chickens with drooping wings: This is not a symptom of any particular disease, but it can be taken as an indication that there is something wrong, and if there is no visible sign of any complaint, such as diarrhoea in particular, lice can be suspected; not so much on the birds, but in the woodwork of the place they stay in at night time. If vermin is not the cause, perhaps there is overcrowding. Dirty water-vessels are also a frequent cause of chickens dying; then again there is feeding off tainted ground, sour food, and over-feeding.

This Department does not want people to give up poultry-keeping; we want more persons to go in for this important bye-product, so that importation of eggs may be speedily reduced. All difficulties that may arrive to any poultry-keepers will be willingly attended to free of cost by writing to the Department. All communications should be addressed to the Under Secretary for Agriculture, Agricultural Department, Perth, or the writer can be seen personally when at the Head Office.

THIRD EGG-LAYING COMPETITION AT SUBIACO.

[Commenced July 1, 1908. To close March 31, 1909.]

Appended, herewith, are the results for the new competition which commenced on the 1st July and is to run for nine months, terminating on the 31st March, 1908.

Eggs for sitting from any of the pens are obtainable on application to the Manager at Subiaco; prices range from 10s. 6d. to 21s. per dozen. A price list is forwarded on application, or see the *Journal* for July.

The following are the results up to October 31:—

The figures in black indicate the winner of the monthly prize.

The first column of figures indicates the present position of the pens in the competition.

Pens marked thus * remained in from last competition.

FOWLS.

Six pullets and one male bird in each pen.

Owner and Breed.	July.	Aug.	Sept.	Oct.	Total
1 Mrs. A. S. Craig, Black Orpington	131	145	129	146	551
2 Sunnyhurst (S.A.), White Leghorn	109	111	143	143	506
3 Mrs. L. Mellen, White Leghorn	106	126	133	128	493
4 S. Craig, White Leghorn	81	126	133	144	484
5 Gaffney & Bach, White Leghorn	102	117	128	156	483
6 Mrs. Kynaston, White Leghorn	91	130	122	139	482
7 Mrs. C. F. Schmidt, White Leghorn	104	117	127	131	479
8 A. H. Padman (S.A.), White Leghorn	71	124	146	137	478
9 C. Herbert, White Leghorn	86	129	133	129	477
10 J. W. Buttsworth, White Leghorn	113	133	117	113	476
11 A. M. Thomas, White Leghorn	77	133	132	133	475
12 Lionhurst Poultry Farm, Buff Leghorn	104	116	121	132	473
13 Mrs. A. E. Kinnear (S.A.), White Leghorn	82	110	136	140	468
14 Glendonald Poultry Yard, Silver Wyandotte	92	117	129	125	463
15 T. W. Martin, White Leghorn	76	126	131	129	462
16 C. B. Bertelsmier (S.A.), White Leghorn	94	125	121	121	461
17 Greenville Poultry Farm, White Leghorn	97	114	127	118	456
18 Shamrock Poultry Farm, White Leghorn	82	99	133	131	445
19 G. Bolger, White Leghorn	49	115	138	139	441
20 E. Garbett, White Leghorn	71	129	120	120	440
21 Homebush Farm, White Leghorn	80	107	118	135	440
22 T. Ockerby, White Leghorn	62	126	116	129	433
23 Bon Accord Poultry Yard, White Leghorn	94	119	102	116	431
24 Mrs. Hobley, White Leghorn	87	118	111	110	426
25 W. Elliot, White Leghorn	89	109	109	114	421
26 J. Gaffney, White Leghorn	83	106	119	112	420
27 Greenville Poultry Farm, Silver Wyandotte	105	97	107	110	419
28 Paddy King & Salter, White Leghorn	95	101	105	108	409
29 Ontario (S.A.) White Leghorn	72	82	106	140	400
30 Mrs. Flynn, White Leghorn	78	94	114	111	397
31 Honner and Forbes, R.C. White Leghorn	69	99	111	114	393
32 Mrs. Hughes, White Leghorn	57	92	126	116	391
33 Devine & Migro, White Leghorn	58	94	115	121	388
34 Mrs. Younger, White Leghorn	41	97	121	126	385
35 Coolgardie Poultry Farm, White Leghorn	66	97	110	112	385
36 The Elms Poultry Yard, White Leghorn	51	92	111	124	378
37 *White Wings P.F. (No. 2), White Leghorn	71	93	103	111	378
38 Craig Bros., Black Orpington	70	97	90	121	378
39 J. R. De Morrison, White Leghorn	61	104	108	105	378
40 O.K. Poultry Yards, White Leghorn	34	10	119	115	374

EGG-LAYING COMPETITION—*continued.*FOWLS—*continued.*

Owner and Breed.	July.	Aug.	Sept.	Oct.	Total
41 *J. W. Martin (late O. James), White Leghorn	62	104	114	93	373
42 *J. Stuart, Golden Wyandotte	69	101	99	103	372
43 G. George, White Leghorn	66	96	103	106	371
44 R. G. Flynn, White Leghorn	86	92	88	101	367
45 A. E. Champness, White Leghorn	40	108	109	110	367
46 *Adelaide Poultry Yard, R.C. Brown Leghorn	62	99	106	96	363
47 *J. D. Wilson, Brown Leghorn	42	84	110	117	353
48 South Perth Poultry Farm, R.C. White Leghorn	61	91	92	108	352
49 *Mrs. McGree (No. 1), White Wyandotte	49	107	91	99	346
50 F. Whitfield, Minorca	57	71	89	122	339
51 Adelaide Poultry Farm, Buff Leghorn	33	82	104	106	325
52 Mrs. McGree (No. 2), White Wyandotte	40	90	108	81	319
53 T. Hickey, White Leghorn	0	84	130	102	316
54 Hillview Poultry Farm, White Leghorn	51	92	83	89	315
55 *Craig Bros. (No. 1), White Leghorn	30	93	88	103	314
56 Craig Bros. (S.A.) (No. 2), White Leghorn	49	81	90	88	308
57 *Mrs. H. M. Kelley, Gold Wyandotte	33	85	96	92	306
58 *J. Stuart, Silver-pencilled Wyandotte	33	74	101	94	302
59 *Mrs. H. M. Kelley, White Leghorn	23	68	106	104	301
60 *White Wings Poultry Farm (No. 1), White Leghorn	52	65	80	96	293
61 J. Stuart, S.L. Wyandotte	57	72	83	62	274
62 R. L. Martin, Black Orpington	95	84	69	62	274
63 Craig Bros., White Orpington	57	73	60	67	257
64 J. Miller (late Dobson), Silver Wyandotte	34	59	40	38	171

Winner of first monthly prize, Mrs. A. S. Craig, Black Orpingtons, 131 eggs; second month, Mrs. A. S. Craig, 145 eggs; third month, A. H. Padman, White Leghorn, 146 eggs; fourth month, Mrs. Craig, Black Orpingtons, 146.

Winner of first three months test, Mrs. A. S. Craig, Black Orpingtons, 405 eggs.

DUCKS.

Six ducks and one drake in each pen.

Owner and breed.	July.	Aug.	Sept.	Oct.	Total.
1 White Wings Poultry Farm, Buff	114	177	162	166	619
2 *Mrs. L. Mellen, Indian Runner	131	141	154	149	575
3 D. F. Vincent, Indian Runner	119	132	133	177	561
4 *G. Thomson, Indian Runner	131	135	150	142	558
5 F. Whitfield, Indian Runner	106	148	146	156	556
6 *Smith & Davenport, Indian Runner	116	128	136	154	534
7 H. Carr and Son, Indian Runner	142	137	136	118	533
8 C. Phillips, Indian Runner	101	117	144	150	512
9 C. Geddes, Indian Runner	89	134	134	135	492
10 J. Moyle, Indian Runner	114	115	137	102	468
11 Mrs. R. B. Moyle, Indian Runner	132	127	92	113	464
12 J. Robertson, Indian Runner	32	108	179	143	462
13 *South Perth Poultry Farm (No. 2), Pekin	7	116	160	147	430
14 Greenville Poultry Farm, Indian Runner	68	85	140	128	421
15 Bon Accord Poultry Yard, Buff	54	86	132	137	409
16 A. W. Edgar, Indian Runner	12	96	149	152	409
17 Adelaide Poultry Yard, Indian Runner	49	105	122	124	400
18 *F. Whitfield (late Dusting), Indian Runner	72	48	108	128	356
19 C. W. Johnston, Indian Runner	24	26	120	165	335
20 South Perth Poultry Farm (No. 1), Pekin	0	50	137	143	332
21 Coolgardie Poultry Farm, Pekin	0	40	143	106	289
22 Simplex Incubator Factory, White Indian Runner	4	9	109	162	284

Winner of first monthly prize, H. Carr and Sons, Indian Runners, 142 eggs; second month, White Wings Poultry Farm, Buff Orpingtons, 177 eggs; third month, J. Robertson, Indian Runners, 179 eggs; fourth month, D. F. Vincent, Indian Runners, 177 eggs.

Winner of first three months test, White Wings Poultry Farm, Buff Orpingtons, 453 eggs.

By courtesy of Messrs. Mott.



Clampton, Singapore, known as "Hardy's Muttons," property of Messrs. Mottwick Bros.,
(Royal Agricultural Show).

EGG-LAYING COMPETITION--continued.

SECOND YEAR'S TEST--POWLS.

Owner and Breed.	July.	Aug.	Sept.	Oct.	Total.
1 J. Stuart, Golden Wyandotte	69	101	99	103	1,772
2 Craig Bros.' No. 1, White Leghorn	30	93	88	103	1,609
3 Mrs. McGree, No. 1, White Wyandotte	49	107	91	99	1,534
4 J. D. Wilson, Brown Leghorn	42	84	110	117	1,478
5 T. W. Martin (late James), White Leghorn	62	104	114	93	1,448
6 Mrs. Kelley, Golden Wyandotte	33	85	96	92	1,425
7 Adelaide Poultry Yard, R.C. Brown Leghorn	62	99	106	96	1,412
8 J. Stuart, Silver-pencilled Wyandotte	33	74	101	94	1,227
9 J. Miller (late Dobson), Silver Wyandotte	34	59	40	38	1,204
10 White Wings Poultry Yard No. 1, White Leghorn	52	65	80	96	1,188
11 Mrs. Kelley, White Leghorn	23	68	106	104	1,111

SECOND YEAR'S TEST--DUCKS.

Owner and Breed.	First year.	July.	Aug.	Sept.	Oct.	Total.
1 G. Thomson, Indian Runner	1,571	131	135	150	142	2,129
2 Smith and Davenport, Indian Runner	1,333	116	128	136	154	1,867
3 F. Whitfield (late Dusting), Indian Runner	1,493	72	48	108	128	1,849
4 Mrs. L. Mellen, Indian Runner	1,244	131	141	154	149	1,819
5 South Perth No. 2, Pekin	840	7	116	160	117	1,270

IS SUPERPHOSPHATE INJURIOUS ?

By A.L.B.

One often hears the remark passed by practical farmers that as good results do not seem to be now obtained from the use of superphosphates as heretofore they are somewhat at a loss to explain the reason. All sorts of reasons are assigned as the cause, but as a matter of fact there are very few of these come very near the mark. It remained for Dr. Howells, who was for many years Agricultural Chemist in Victoria, to solve this question; and when he became associated with the Mt. Lyell Company he determined to put his theories to a practical test in the manufacture of superphosphate. By experiments it was found that when a liberal supply of superphosphate was applied to the ground it did not appreciably diminish in fertility, so that the cause had to be looked for in some other direction.

While it is generally recognised that the application of phosphatic manures alone gradually depletes the ground in the other two principal constituents (potash and nitrogen) required to maintain a healthy growth, this was not recognised as being the principal cause of the diminution of the crops on which superphosphates have been applied. It was found to be characteristic of the soils of Victoria, Western Australia, and many other parts of the Commonwealth that they were largely deficient in phosphoric acid, but that potash and nitrogen were usually found, with certain exceptions, in sufficient quantities. The cause, then, must be looked for outside of the question of the lack of any of these three principal constituents. An analysis of the ordinary imported superphosphates shows that they were heavily impregnated

with sulphuric acid. It was here that Dr. Howells first suspected and finally proved that the cause of the unsatisfactory results that were sometimes obtained, after a continuous use of superphosphate, was to be found.

The process of the manufacture of superphosphate is very simple. The phosphate rock is ground to a fine powder, it is then treated with sulphuric acid to convert the insoluble phosphate to a water soluble and acid soluble, state and render them available as a plant food. It is in the quantity of sulphuric acid used to accomplish this result that the principal cause of the trouble may be attributed.

In most of the imported superphosphates there will generally be found an excess of sulphuric acid. In a climate like England or the Continent, where they have a heavy rainfall, this may not be found injurious, as the sulphuric acid is to a certain extent leached out of the ground, but in the wheat-growing areas of Australia, where the rainfall is much more limited, it has been found that the sulphuric acid accumulates in the ground. Sulphuric acid is a powerful fungicide and an insecticide, and when present in the ground in such large quantities it destroys many of the beneficial soil bacteria which are necessarily present in the ground that has a high fertility.

In the manufacture of Mt. Lyell superphosphates the minimum quantity of sulphuric acid is used to produce the necessary conversion from insoluble to soluble phosphates, and this to a large extent accounts for the superior results obtained by its use in every part of the Commonwealth. It is not generally known to what extent the use of sulphuric acid enters into the use of superphosphate, and when it is pointed out that every ton of superphosphate contains only 10cwt. of phosphatic rock, the balance of the added bulk being made up with sulphuric acid and moisture, it will be recognised that this is the primary cause of the gradual falling off of crops where imported superphosphates containing excess of sulphuric acid are continuously used.

It may be authoritatively stated, however, that where superphosphates are used which contain only sufficient sulphuric acid to render them soluble, that no injurious effects will be noticed from their combined application. On the other hand, it has been demonstrated that where sufficient superphosphate of the right kind is used, there should be an appreciable increase in the crops. It must, however, be remembered that no manure will take the place of good cultivation in the seasons, and that on these factors are largely dependent the success or otherwise of the crop.

NOTICE TO SUBSCRIBERS.

Subscribers, whose subscriptions to the *Journal* terminate with the December number, are requested to forward to the Editor notice of renewal with amount of annual subscription (Five shillings) enclosed, or notice to discontinue, as the case may be. The Editor reminds subscribers who omit to comply with this rule that they are liable to have their names removed from the subscribers' list.

CORRESPONDENCE.

THE AIR-SAC MITE.

Under date Geraldton, October 22, Mr. L. V. Nathan, V. S., and late Inspector of Stock, Eastern Goldfields, writes on the above subject to the following effect:—

“I have the honour to bring under your notice the fact of having discovered a disease that is decimating the poultry yards of the goldfields to a considerable extent; it is due to the presence of a member of the Arachnidæ family in and about the viscerae. Until quite recently this order has been looked upon by most authorities to contain strictly external parasites, therefore, the fact of discovering them in internal situations may probably revolutionise the whole theory on the subject.

In the year 1895 my attention was first directed to some fowls that were apparently healthy, dying suddenly, subsequent to their removal from the Port Adelaide Show of that year. There were no external lesions, the fowls having gone to roost, the next morning I found them dead under their perches; on making an autopsy of the birds (a rooster and hen of the Buff Cochin breed), I discovered the peritoneum in each instance covered with minute granules similar to the pollen of flowers. On submitting to microscopical examination, I found the parasites in question, as they were also in the heart, and as death had resulted from endocarditis, I naturally concluded that they were the immediate authors of the trouble.

I could find no literature on the subject until 1896, when I discovered an article in the Veterinarian of that year, written by William Alston Edgar, F.R.C.V.S., of Dartford, England, entitled *A New Parasitic Disease*. He gives a drawing of the acarus, and a description which is similar to my own observations, with the exception that he shows no appendages on the outside of the two anterior legs. He also compared the specimens and found them dissimilar to the following:—

Sarcoptes Hominis, *Sarcoptes Equi*, *Psoroptes Longirostis*, *Psoroptes Ovis*, *Symbiotes Spathiferis*, *Leptus Autumnalis*, and *Demodex Folliculorum*. He also states a parasite mentioned in Dr. Cobbold's work *Damys Nissus Gallinae*, but this he does not appear to have seen.

I mentioned my discovery to several persons interested in the subject, but as some doubt was expressed, I thought it discreet to retain my information.

During a tour in South Australia, when acting as Government expert and lecturer to the Agricultural Department of that Colony, I frequently came across birds with the disease, and made full notes of all symptoms and general details with a view of helping to correctly diagnose.

In most instances if the subject be carefully noticed, it will be found extremely listless, not caring to get-out of one's way, the head depressed on the breast, with nictitating membrane drawn over the eyes, and segregated from

the other birds in the yard. In some cases pustules may be seen about the head and eyes, but I have not discovered that these contain either eggs or aceri, although I have carefully submitted them to a searching examination with 1/12 oil immersion. Occasionally there is wasting and great emaciation. In such cases I find the lungs on autopsy to be invariably suffering from inflammation, but the birds when once attacked by the acarus seldom live long enough to attain this stage; should they, however, such cases are easily diagnosed, owing to a peculiar choking cough which is generally repeated at short intervals. As a rule the heart is attacked in the early stage before emaciation has had time to occur, when an apparently healthy bird is found dead under its perch, and the verdict of roup, which seems to be the only name for fowl disease, has resulted.

Three years ago I first discovered the disease at Coolgardie in some fowls owned by Warden Finnerty, R.M.; this was the first occasion that I had the opportunity of viewing the parasites alive under microscope. To prove that the disease existed, I killed a fowl, and was immediately enabled to obtain the originators of the trouble. In less than a minute after their removal from the peritoneum of the bird they succumbed, probably owing to the increased temperature or dryness of the atmosphere, thereby proving that they are unable to live a saprophytic existence, and the fact that they have suckers and no claws pronounces them to have originally developed in the stage in which I found them in the interior of the fowl. I brought this case under the notice of the late Dr. T. G. Davy, M.D., Oxon, then resident at Coolgardie, who with his usual scientific zeal, kindly interested himself in the matter, and was most enthusiastic. He discovered the acrus in the lymph spaces that exist under the membrana nictitans or third eyelid. From here it probably gets into the trachea, afterwards proceeding to the bronchi and producing inflammation of the lungs by occluding the air passages. Dr. Davy also indicated treatment by hypodermic medication.

The greatest difficulty that I have experienced throughout my investigations has been the trouble in obtaining literature with a view to identification, and I would express my gratitude to Mr. R. Helms, the biologist to the Department of Agriculture, who at great expense of time and personal inconvenience, has hunted through the collection of literature owned by his Department, and has at last discovered the acrus portrayed with the full description in the 1895 edition (of the work of P. Megnin), *Les Parasites*, and I now find it to be the *Cyrtolitus Sarcoptoides*, originally discovered in Germany by Gerlach and Zundel.

I am at present carrying on control and cultivation experiments with a view of mapping out the life history of this decimator of our poultry yards, and as poultry in this State are nearly the price of sheep elsewhere, I thought it my duty to bring the matter under your immediate notice."

[In Dr. Salmon's work on *Diseases of Poultry* (in the Departmental library), he deals with this interesting subject, and quoting Megnin and other authorities, describes the parasite referred to by Mr. Nathan, which is recognised as the Air-sac mite, or *Cyrtolites nudus*, an internal parasite, closely allied to the external species of the *Sarcoptoides* order. The woodcut represents the female parasite, illustrations of which are given in both Megnin and Salmon's works. The following extract from the latter's treatise explains

the methods of this destructive germ, symptoms and effects of the disease and curative treatment. Nothing, however, is said of its prevalence in Australia, and this Mr. Nathan claims to have discovered.—Ed. *Journal of Agriculture*.]

The Air-Sac Mite.

The peculiar arrangement of the respiratory organs in birds has led to the development of a form of parasitism which is not seen in our other domesticated animals. One of the mites has domiciled itself in the air-sacs of the gallinaceous birds, especially in poultry and pheasants, and is found at times in great numbers even in the abdominal sacs and in those which penetrate the bones. This mite, called the *Cytodites nudus*, is closely related to those mites which live upon the skin and cause mange or scabies. Indeed, when first discovered it was supposed by Gerlach to be one of the mange insects and to cause an internal form of that disease.

Careful study has shown that while the *Cytodites* is closely related to the mange, acari, it differs from them in very important characters. The mouth parts in the mange mites are formed to cut and tear the flesh and enable the mite to burrow into the skin, or, at least, to puncture the skin and obtain blood or serum for its sustenance. In the air-sac mites the mouth parts are grown together and form a tube through which liquids may be sucked, but which is not adapted for tearing or puncturing the flesh. It would appear, therefore, that these mites can only produce a superficial irritation by their presence and movements upon the delicate surface of the mucous membranes, or possibly by depositing a virulent saliva such as is supposed to be the cause of a part of the irritation of mange. Nevertheless, Holzendorff states that in addition to the infection of the air-sacs he has found in the lungs, liver, kidneys and other viscera, a great number of yellow miliary tubercles in which he also recognised this parasite.

When the air-sac mites exist in very small numbers, no signs of irritation or ill health are seen in the affected birds. When they become very numerous, however, they cause considerable irritation of the lining membrane of the air-sacs and they are crowded into the bronchi, where they set up inflammation which may take the form of bronchitis or broncho-pneumonia. Meguin states that in such cases there may be obstruction of the air-passages causing fits of coughing and even sudden death from suffocation. Gerlach accused the *Cytodites* of causing enteritis (inflammation of the intestines), and Zundel thought they caused both enteritis and peritonitis (inflammation of the serous membrane lining the abdominal cavity). They probably cause anaemia, loss of flesh, and general unthriftiness, even if no form of acute disease develops.

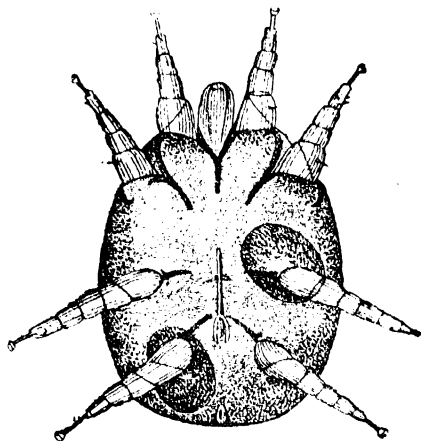
This parasitic affection of the air-sacs is, of course, a contagious disease. The mites cannot live for a very long time outside of the bird's body: they are brought upon a farm with affected birds and as opportunity offers they pass from bird to bird until the greater part or the whole of the flock becomes contaminated. No doubt the mites penetrate the body by crawling into the nostrils and following the trachea and bronchial tubes until they reach the air-sacs. How frequently, or under what circumstances they leave the air-sacs and seek the outside air is unknown.

Symptoms.—In many cases birds affected with the air-sac mite show no symptoms of disease, and the existence of the parasite is only discovered acci-

dentally when the carcass of a bird which has died from some other cause is being examined. In other cases the fowls are listless, inactive, with pale comb, and loss of flesh. Occasionally one dies without any apparent cause. The acute cases may come on without premonitory symptoms. The affected birds are found quite ill, standing by themselves, with neck retracted, wings drooped, and laboured breathing. There may be rattling of mucus in the throat as in bronchitis, or paroxysms of coughing. Death may come suddenly from obstruction of the air tubes with plugs of mucus, or in other cases the illness may be prolonged and the birds die of exhaustion.

The mites are readily discovered on the walls of the air-sacs after the death of the bird. They are about one-fiftieth of an inch in length and, therefore, easily seen with the naked eye. They are often so numerous that the surfaces of the air-sacs appear as though dusted with a whitish or yellowish powder. By careful watching, the points of which this powder is composed are seen to move and may be made out as the individual acari. The mucous surface of the air-sacs may also be covered with yellowish points of exudate, the result of the irritation caused by the parasite, while the bronchi are congested and partly filled with mucus. In extreme cases there may also be pneumonia.

Treatment.—Meguin recommends giving sulphur mixed with the food and states that the small quantity volatilised and eliminated by the lungs is sufficient to kill the parasites. Others advise fumigation with the vapours of burning tar or the steam from boiling tar water. If this mite is discovered in the flock, efforts should be made to entirely eradicate it. No birds from an infected flock should be sold for breeding purposes. Feeding sulphur and fumigations may be tried, but the flock should be carefully watched, and if the parasite persists in spite of this treatment, it would be better to kill off all the birds, disinfect thoroughly, and start with new birds from a flock known to be healthy. One of the best plans to secure a flock free from parasites of all kinds is to purchase eggs, hatch them in an incubator, raise the chicks in a clean brooder, and put them on ground that has not been used for fowls for several years. There are so many parasites to which birds are subject, that may be avoided in this way, that we would recommend the plan to all who have discovered that their fowls are infested with parasites, or who for some mysterious reason have failed to make poultry thrive and yield satisfactory returns under ordinary conditions.



Female Cyrtodites Nodus.



Potatoes showing Spindle Disease (*Persola tumentosum*).

WHEAT IN THE NOR'-WEST.

We are in receipt of the following letter from Mr. G. R. Ray, of Balla Balla, which affords evidence that the wheat-growing possibilities of this State are wide and capable of great future developments:—

"I enclose samples of wheat grown at Balla Balla on uncultivated land. These samples sprang up where horses were in the habit of being fed—the seed being from chaff. Previous to May 21 we had no rain for over 10 months; since this date to July 26 we had seven inches. I have sent these samples to show that with an ordinary rainfall cereals could be grown in the North-West, and certainly with irrigation, and I am of opinion that within 20 years the North-West will be wheat producing. Seasons change, and I can remember in parts of Riverina, about Jerilderie and other dry parts, where wheat is now grown by the mile, that if a person, 20 years ago, had suggested the growing of wheat, he would have been thought a fit subject for a lunatic asylum."

DISEASED POTATO SEED.

Mr. J. Hortin, a settler at Hortin's Crossing, Denmark, makes the following complaint:—

"I am forwarding you a few potatoes (an illustration of which is given here (for you to see the kind of seed which has been sold this year to a lot of new settlers out this way from Victoria. There have been a good many tons sold here this year as prime seed, of which I got three bags, thinking they were all right. But I put them on shelves to see if they would shoot right, and these I am sending you are diseased ones. If you cut the tail end you will see such is the case. About a quarter of them are like these, the rest have good shoots. Well, Sir, as we have a lot of new settlers going in for potatoes, I think it is a shame they should have this kind of seed thrust upon them when they depend so much on making a good start on the land. I hope something will be done in the matter."

IMPRESSIONS OF THE FIRST INTERNATIONAL FOOD CONGRESS.

By LOUDON M. DOUGLAS, Lecturer on the Meat Industry, Edinburgh.

The first Congress of an International character which has just been held at Geneva will be memorable because of the wide-spread interest it evoked. The idea of such a Congress has often been in the minds of those associated with food supply, but the standards vary so much in different countries that at the outset it may be admitted that the difficulty of meeting upon some common ground has so far prevented international action. The value also of any resolutions passed must, for the greater part, be of an entirely academic character inasmuch as it is clear that indiscriminate voting at such a Congress on any specific resolution must be unequal, and the nation

with the preponderance of representatives present must control the issues. To be of any value, therefore, such congresses must appoint an equal number of delegates who have power to vote, and might be arranged to protect the interests of minorities by giving them power to co-operate with representatives from other nations so as to equalise their voting power.

The Congress, which was held at Geneva from 8th to 12th September inclusive under the auspices of the Society of the White Cross of Geneva, owes its origin to Frenchmen, and M. Ruau, the French Minister of Agriculture, attended its deliberations and also outlined his own, and presumably his Government's attitude, in relation to the food supply. The fact that out of the 400 odd delegates present from all countries some 250 were French, serves to illustrate the point that, voting upon any resolution under such conditions could not be described in any sense of the word as representative of international opinion.

The primary object which the society hopes to attain is described in the title, which states that it exists for the Repression of Frauds in Food and Pharmaceutical preparations. With such a rôle it will be admitted that it has a vast field of activity before it, but the political element must be suppressed, otherwise it is quite clear that such a society may be made simply the tool of whichever country cares to exploit it the most.

There were twenty-nine different nations represented; but some of these had only a very limited number of delegates present, and many were quite unofficial, having come on their own initiative. This was noticeable with regard to the United Kingdom, which was not officially represented, although the Local Government Board had intimated that such a delegation would be sent.

The programme presented to the Congress was a large one, and dealt with many subjects in varying aspects, the discussions being largely made up of a mixture of science and commerce. The first day's proceedings were taken up with arriving at a definition of wine, but from the British point of view that is a subject which has only a local interest. The definition arrived at, however, may be of interest outside of wine-growing countries. Wine was defined as being generally, the product of the alcoholic fermentation complete or incomplete, of fresh grapes, or of the juice of fresh grapes. The signification of the definition lies in the fact that during recent years much sophistication has taken place in wines, more especially for export: with the consequence that the demand has gone down considerably, and over-production has caused much depression in the wine districts of both France and Spain.

Vinegar was also defined as the exclusive product of the acetic fermentation of wine; but that is clearly a definition suited to France or Spain and few other countries. Other definitions of an equally comprehensive character was given for cider, perry, beer, and liqueurs.

The second day was devoted to defining milk, butter, cheese, eggs, fats used for foods, and various commodities associated with "Charenterie," which is in reality the business of pork purveying and the manufacture of pork products. With it, however, is associated preserved and other provisions. The definition of butter proved to be the one in which most interest was taken, and the discussions regarding what was pure butter really was sometimes became very animated indeed. Finally, however, it was agreed that butter was a mixture of fatty matters exclusively derived from cow's

milk after fermentation, and made either from whole milk, separated fat, or a mixture of both.

The use of preservatives in butter naturally occupied much attention, and while many of the French delegates opposed it, others as effectively supported it; and it was soon apparent that a large number, inclusive of the British delegation, were strongly in favour of a definition that boric acid preservative should certainly be allowed. Such opposition as exhibited itself seemed to be from a section which did not attempt to specify any objection from the point of view of health, but rather from the point of view that the use of preservative favoured the manufacturer, as distinguished from the farmer or the co-operative societies. No decision, however, was reached, and the whole question was postponed to a future conference, to be discussed under the head of "manipulation."

The British section, through their spokesman, Dr. Tunnicliffe, pointed out that the descriptive text in which the attitude of the various nations to this matter was given, was entirely wrong in stating that the use of preservative in the United Kingdom was prohibited and that, on the contrary, it was allowed by the responsible Department of State up to .50 per cent. A further discrepancy in this definition also appeared in the absence of any reference to the allowable percentage of water. On the whole the matter was left in a very unsatisfactory condition, and it may be assumed that at the next congress the necessity for boric acid as a preservative, in addition to salt, will not only be recognised as desirable, but will be declared to be essential in all butters which have to be kept for any length of time beyond two days.

Cheese was defined as being the product of whole milk treated in the usual manner but, of course, such a definition can have no weight whatever. The milk from which cheese is made varies considerably, as does also the recognised fat contents of cheese, and it will need much greater precision in definition before a clear understanding can be arrived at. Eggs, again, were only entitled to be described as fresh when not submitted to any process of preserving, and oils and other fats did not attain any more definite descriptions. Frozen meat was placed in the category of preserved meats, a definition which will hardly be accorded general approbation; and sausages were only entitled to be described as "pure" when free from all other ingredients except meat, pork, or veal, in addition to the seasonings. They ought not to contain any greater percentage of moisture than the natural moisture of the ingredients. Of the other articles in the same class, none call for any special notice except salted meats, which were defined as being made from meats salted exclusively with commercial salt, with the addition of variable quantities of saltpetre and sugar. The inclusion of such a preservative as saltpetre may be regarded as indicating that the principle of using other preserving agents besides salt is unavoidable, and in this connection the general opinion was that it will be found impossible to inhibit the production of certain ptomaines without the use of boric acid or other similar preservative.

The manufacturers of cocoa seem to be very much divided as to what that article really is, as, judging from the discussion the partisans of the use of alkaline carbonates maintained successfully that the addition of such chemical products did not interfere with the purity of the substance. The question is one for manufacturers, and some of those whose names are known

in many countries insisted on the recognition of this principle. As with cocoa and its cognate productions, so with tea and coffee. Purity from admixtures of all kinds was the keynote throughout.

In the departments of mineral waters, pharmaceutical preparations, and the unification of analytical methods, it would seem to be rather difficult to obtain such definitions as would be acceptable to all countries as the practice must necessarily be governed by local tradition to a great extent, as well as the demands of the public. It is desirable from the international point of view that there should be unification of formulas, but such a result can hardly be expected from a mixed congress such as this, and indeed would seem to be altogether out of its province.

On the whole, the First International Food Congress may be said to have been interesting, as an opportunity for the exchange of opinions on many questions affecting the food supply, and the very inconclusiveness of the discussions would seem to demonstrate the necessity for better organisation in the future. The Congress may be looked upon as being established, and is likely to continue from year to year. Possibly, it may be found practicable to invite the various national representatives to the United Kingdom so that the British nation may also have an opportunity of witnessing in detail what precautions are considered necessary in the handling of food in other countries. It must always be remembered that we are more interested than other nations in this aspect of the question, as we are buyers of food supplies to a greater extent than any other.

It only remains to be said that the thanks of the Congress are due to the secretary, M. Fazy, and the local committee, for the excellent arrangements made. Thanks are also due to the University of Geneva for placing the rooms and hall of their Classic Institution at the disposal of the Congress. The ticket of membership carried the delegates to the Kursaal, and a fête at the Parc Caux-vives arranged by the committee of the Society of the White Cross of Geneva, and many other well appointed functions.

As showing, also, the interest taken in the work of the society, it may be mentioned that a princely donation of 100,000 francs was given by Madame Paul Bolo, and many others of a lesser amount have also been received. In-so-far as the British section is concerned, arrangements will be made in the future for a proper organisation, and permanent secretaries will be appointed to represent the manufacturers and the scientific sections of the United Kingdom, so that the next congress, which will be held in Paris next year, will be attended by a British delegation worthy of the subject.



Champion Jersey Bull - "Mick's Boy" - property of Mr. H. G. Hinde (Royal Agricultural Society's Show).

SOME MINOR PRODUCTS FOR FARMERS.

By A. MOLINEUX, late of the Agricultural Bureau, S.A.

There are some farmers in South Australia who grow, produce, or manufacture nearly everything that is used or consumed upon their farms; and there are others who purchase even bread, meat, vegetables, butter, cheese, eggs, bacon, and many other articles which possibly might be produced by themselves or their families. The saying that the "farmer feeds all" ought at least to apply to his own family, but what shall we say to the farmer who regularly has the baker, butcher, grocer, dealer, fruit and vegetable men calling at his back door?

At all times it is wise to exercise thrift, and because they can afford to be generous to those who have not been as fortunate as ourselves, but it is more than ever necessary to be careful of our goods and chattels during these hard times. We cannot afford to stand idle whilst the fences are out of repair, or the sheds and outbuildings want to be put in order. Bags need mending, implements must be painted and oiled, and a hundred and one little jobs will profitably occupy any spare time that we may have or when the rain stops work outside or in the field. The ingenious and handy farmer will make many a useful implement from the wheels of worn-out ploughs or the ironwork of other tools, etc., that have passed their period of usefulness in the original form. Mats, ropes, halters, and other useful articles can be made from the twine saved from sheaved hay or grain; and very many articles that are usually left lying about the place, often to the injury of the live stock, could either be put to some use upon the farm or else sold for a trifle. Old ploughshares and miscellaneous iron might be taken into the township and sold, or at least should be put where they cannot cause accidents. Some farmers make a good sum from skins, horns, and bones—but the bones ought to be used as manure. Skins of rabbits, hares, dogs, horses, cattle, sheep, and all others have a value sufficient to pay for all care in properly stretching and preserving them. Feathers and horsehair will pay for saving if nicely dried and kept clean. Many of these articles can be taken charge of by the children and weaker members of the family. Where there are wattles and pine-trees the youngsters can earn some money by gathering the gum from the first and gum-sandarach from the other. They can grow mint, sage, thyme, parsley, tarragon, marjoram, balm, savory, and other culinary herbs, which can be dried in the shade, rubbed off the stalks, and sold to butchers, restaurant-keepers, and others. I know of one young woman who earned £40 in one year from dried thyme-leaves alone, and she did the cooking for a large family and attended to the other housework beside. Various kinds of medicinal herbs, roots, and the like might also be grown, but it would be better for the older members to attend to this part. Then there are certain kinds of perfume plants which might be grown if there were a distillery near enough; also plants which produce essential oils. Lavender,

rose leaves, and some others can be dried, packed tightly into bags, and sent to Europe for sale to the distilleries for perfumes.

With regard to many products which might be mentioned, it will be said that the labour bestowed on their production would not be repaid in the price realised for them. That is doubtless correct if we had something better to do with our time, but it does not pay to do nothing, and the innumerable small rills of money rolling into the general income during a year will make quite a considerable amount when added up. I have heard many farmers declare that the hens and the cows have brought more money during the year than has been obtained from the wheat and hay crops. The hen is a good one if she lays one egg a day for a month, and the cow that gives three gallons of milk per day is better than an average cow; but the value of the produce of both cow and hen is hardly worthy the attention of a man who expects to grow 3,000 bushels of wheat by the end of the season—and yet he finds that his wife makes more profit from a dozen cows and 50 hens during the year than he gets from his large fields of grain. Why is it thus? Simply because the hens keep laying and the cows give their dole of milk every day for the greater part of the time, whilst he gets only the one crop for all his labour. Seeing, then, that these smaller items make profit, it is desirable that we should give them some thought.

It has been said that it does not matter about burning the straw on the farm, because all that is wasted is the nitrogen, and the atmosphere consists principally of nitrogen, therefore we need not trouble about the waste. On the same principle a man standing near the Union Bank with a pound note in his pocket need not be afraid to use it as a pipe-light, because there are thousands of other notes in the bank. We can get the nitrogen from the air only by growing leguminous crops, and for this we have to lose a season if we plough them under, or we might better feed them off. I maintain that it is a wicked waste to burn the straw if we can utilise it as food for live stock, though it must be admitted that sometimes there is so little of it that it will not pay for the labour of gathering it in. Not more than 124lbs. of ash remain from a ton of burned straw, and much of that gets blown away before it can be ploughed under—about 2,116lbs. of valuable fertilising matter went away in the smoke and gases. Straw when cut just before the grain is dead ripe contains a good lot of nutriment, and can profitably be mixed with richer food to give it bulk. If it can be chaffed and steamed first it is still more valuable. If we keep cows it will give us a safe stand-by to have a few good stacks of nice clean straw about the farm. This will serve for roofing sheds, making bedding for the stock, and for keeping them alive, if not in good condition, during periods of scarcity of food owing to drought. Of course every provident farmer will endeavour to save as much as is possible of the surplus natural herbage during good seasons by means of ensilage, but in every season he will try his best to grow a good area of maize, sorghum, holcus, dhurra, millet, kail, kohlrabi, rape, and other fodder crops to serve as food for his cows in particular and other stock in general during summer, autumn, and the early part of winter. He will gather up and put into the midden or manure pit every organic substance that can be readily decayed, and the manure thus made will enrich the soil for the production of abundant crops in the future. His store pigs will make a lot of meat from the waste beets, mangolds, potatoes, maize stalks, etc., left by the stock, as well as from the refuse of the dairy and house; and then they can be

topped-up for about ten weeks on milk, crushed barley, oats, wheat, or peas. Indeed, under present prices it would pay better to feed wheat, etc., to the pigs and live stock generally than to sell it off the farm.

I am quite sure that olives will pay to grow, both for the fruit and for the oil that can be made from it. Linseed will also pay to grow for the sake of its fibre, its oil, and for the resulting cake, to be used in feeding farm stock, especially cows. Colza or rape should be cultivated for its oil and cake; but for fodder purposes the large-leaved variety should be sown. In France and parts of Italy farmers grow a plant of the colza family, known botanically as *Camelina sativa*, very largely for the sake of its seeds, which give a percentage of oil. White poppy is extensively grown in Egypt, India, and parts of Europe for its seeds, which are used considerably as human food as well as for manufacture of oil. The sunflower, also, is grown over immense tracts of land, both for food and for the oil, which, when new, is quite equal to that made from the olive.

We import great quantities of seeds for our farms and gardens; but it ought to pay us to grow most of them for our own use and for export. Canary-seed, hemp-seed, maw (white poppy), rape-seed, hemp, etc., are imported for our birds. Clover, rye-grass, all kinds of pasture-grass seeds are obtained from abroad in great quantity, and we even import seeds of beet, mangold, lucerne, colza, turnip, mustard, maize, peas, and many others which we can grow with the greatest ease for ourselves. Heavy crops of holcus, sorghum, and dhurra can be grown, and the seeds are very nutritious both for man and beast; and yet we have been importing these to some extent. By the way, the best and most characteristic seed heads should be selected from the crops each year for sowing next season, for all of these plants will soon deteriorate if this is not done. We might as well grow the stuff for the brooms with which we sweep out our rooms, instead of sending to America and China for brooms ready made. Mustard grows rapidly and like a weed here, but the Manager of the Waverley Vinegar Works complains that he cannot get enough seed for his purpose, and has to import this and many other kinds of seeds.

Instead of using imported beet sugar so largely, we might manufacture molasses from amber cane, and use honey in place of sugar for sweetening. In America, very many farmers make sorghum molasses and honey serve the place of sugar altogether. Excessive tea-drinking is injurious. When I was a lad, it was the custom for all farm hands to drink small beer, which was brewed expressly for all the family, and only the women folk drank tea—and then not as a regular thing.

Those who smoke could grow their own tobacco, if they do not grow any for sale. It costs a good deal to keep the pipe going all the year round when we have to buy the fuel.

There is a good opening for a few seed farms, where pure and good seeds for farmers and gardeners could be guaranteed. We send away much money for seeds which can profitably be grown here.

Tallow candles give a miserable light, but there are some people who buy them instead of making them for themselves. All fat upon the farm can be used for making soap and candles, or rendered down for greasing axles, etc.

Some of the following articles might be produced by farmers who are situated in favourable localities, and this would keep money in the State

which is now sent abroad:—Nuts of many sorts, including almonds, walnuts, filberts, etc.; dried apples, apricots, currants, raisins and sultanas, figs, prunes and plums, and all kinds of dried, preserved, and bottled fruits, jams, jellies, marmalades, fruit pastes, crystallised fruits; all sorts of sauces, pickles, and condiments, capers, pickled and other forms of olives, candied peel, ketchup, dried herbs, chicory, canary and other seeds, pearl barley, groats, arrowroot, beef and mutton, macaroni, maizena, hops, split peas, mustard, starch, onions, potatoes, oatmeal, insect powder, carob beans (in place of "condition powders"), pyrethrum (insect powder), carroway, cardamon, and celery seed, and others.

We must try to divide our labour that there shall be no dull round of similar occupation. It may even be a relaxation to "knock off work and carry deals." We want one crop to follow another, and to learn how to harvest and even to manufacture some of those crops so that the product shall bring approbation and honour as well as profit to us. There are a few farmers on Yorke's Peninsula whose better halves have earned a famous name for their home-made jams, which are put upon the market and are snapped up at once by appreciative consumers. Now, in some parts of the North the pie-melon grows like a weed, and marmalade of pie-melon and lemons, or with green ginger, is about the best kind that can be made. Could farmers co-operate and establish a factory there might be some day an extensive export of "home-made" jams, jellies, etc., and melon marmalade would not form the smallest or the least popular and profitable item amongst the rest.

BASIC SLAG.

(*Mark Lane Express Agricultural Journal.*)

During the past half century scientific men have done much good work in converting various waste products of manufacturing processes into commodities of a useful character, but probably their most striking achievement in this way was the discovery of the agricultural value of basic slag, a by-product of steel works. This waste substance of the furnace is equal to one ton to every three tons of manufactured steel, and in the neighbourhood of blast furnaces great ugly heaps of the refuse used to be seen lying about all round the works. The factory people had to pay for its removal from their property.

What a change came over the scene, with the discovery of the value of the slag from an agricultural point of view. Instead of being regarded as a nuisance, it became a source of additional revenue. Powerful grinding mills were set up, which reduced it to a fine powder, and it became the medium of an important branch of trade, beneficial to agriculture and to the world in general by increasing the fertility and productive power of the soil.

No longer is the slag regarded as an incumbrance by the owners of the steel works, their wish is that they had more of it to meet the ever-growing demand. The total quantity of basic slag now available annually in Europe is estimated to be about 2,500,000 tons. In Great Britain it is calculated



that about 300,000 tons are produced yearly, and of this quantity nearly half is exported. In Germany, Belgium, and Holland it is employed much more freely and generally than in this country, especially in Belgium and Germany. Whereas the average consumption per acre on grass and tillage land is about 51lbs. per acre in Belgium and 39lbs. per acre in Germany, it is not more than 10lbs. in Great Britain. Agriculture in this country would certainly derive benefit from an increased consumption.

What is Basic Slag?

The process of the manufacture of basic slag has been so often described in detail that it is unnecessary to repeat the story. It will suffice to explain briefly that it is a bye-product in the manufacture of steel by the Basic process introduced nearly thirty years ago. It has been known at various times as basic cinder, Thomas's phosphate powder, Thomas's phosphate, basic slag, and slag phosphate. The name by which it is now generally known to farmers is basic slag, the other names having largely dropped out of use.

Grades of Basic Slag.

Before the passing of the Fertilisers and Feeding Stuffs Act, the vendors used to offer the different grades with a latitude in the guarantees, such as 26 to 30 per cent. quality, 30 to 35 per cent. quality, etc.; but as this latitude is not in accordance with the provisions of the Act, the sellers must now state the definite percentage of phosphate of lime guaranteed in the manure, and the grades most generally known in the trade are—

26 per cent. phosphate of lime.

30 per cent. phosphate of lime.

38 per cent. phosphate of lime.

42 per cent phosphate of lime.

Guarantee of phosphates being subject to the legal limit of error of 2 per cent., if, *e.g.*, a basic slag guaranteed 26 per cent. should not analyse below 24 per cent., the buyer has no legal remedy under the Act against the seller, although the seller in fairness should make a proportionate reduction for the deficiency. Being a by-product, the production of basic slag, so far as its content of phosphoric acid is concerned, is not under the control of the makers, but depends upon the percentage of phosphoric acid present in the ironstone used by the steel makers.

Effectiveness of Basic Slag.

In what does the effectiveness of basic slag as a fertiliser consist? We think it may be said to consist in the three following factors:—

1st, and most important, "solubility" of its phosphoric acid.

2nd, fineness of grinding.

3rd, contents of lime.

Solubility.

The solubility of slag is the percentage of its phosphate of lime, which is soluble in a 2 per cent. solution of citric acid, and that is the standard accepted by the Board of Agriculture in the Fertilisers and Feeding Stuffs Act. Let it be noted, however, that it is optionable on the part of the vendor to guarantee the percentage thus soluble, and therefore buyers must insist upon the percentage being clearly stated, because it is proved more con-

clusively, year after year, both by experimental plots and actual farming practice, that the efficacy of the slag depends in the greatest measure upon its quality in this respect. In our opinion, basic slag ought to be sold solely on its content of phosphate of lime thus soluble, just as superphosphate is sold on its content of phosphate of lime rendered soluble in water.

The present form of guarantee is generally "80 per cent soluble," which means that a 30 per cent. slag has 24 parts soluble; or, put into other words, when a farmer buys a ton of 30 per cent. slag—80 per cent. soluble—he gets 672lbs. total phosphate of lime, but only 537½lbs. of the really effective portion. If the slag contains only 75 per cent soluble, instead of receiving 537½ lbs. soluble he gets only 504lbs. soluble, and he thus loses more than 30lbs. per ton of the most effective part of the slag. If the guarantee is 70 per cent. solubility or less, the farmer is so much the worse off. (If, on the other hand, it contains, as some slags do, 90 per cent soluble, he gets 604¾ lbs. soluble, nearly as much as in a ton of the higher quality 35 per cent. slag with 80 per cent soluble). We would like to impress strongly on buyers the importance of this point.

We may repeat here the report of the Department of Agriculture for Ireland on this subject.

"It has been shown by experiments that the efficacy of basic slag is directly proportionate to the quantity of the total phosphate of lime which is soluble under certain conditions in a 2 per cent. solution of citric acid. Ground mineral phosphate may be added to slag in order to increase the total amount of phosphate of lime; such ground phosphate is not so valuable as the phosphate of lime in genuine basic slag, and unless it has been specially treated, is not so soluble in a 2 per cent. solution of citric acid. It is, therefore, of great importance to insist on being supplied with slag containing a high percentage of phosphate of lime soluble in citric acid."

In an agricultural report of the County Palatine of Lancaster it is stated:—

"In a third experiment basic slag was tried on meadow land. It has been pointed out by distinguished chemists that the value of slag depends to some extent upon the solubility of phosphate of lime when treated for half-an-hour in a 2 per cent. solution of citric acid. Two slags were compared, one having a fineness of 77 per cent. and a solubility of 87.7 per cent., the other a fineness of 90.5 per cent., but a solubility of only 36.5 per cent., and it was found that the more soluble slag gave the better yield, although the less soluble slag was more finely ground. The result is rather important, as it is often the custom when buying slag to notice only the percentage of total phosphate of lime, and the degree of fineness. But from the above results it will be seen that it is advisable to know the solubility of the phosphate of lime in dilute citric acid."

Fineness of Grinding.

Next in importance to the solubility of the phosphate in basic slag is the condition of fineness to which the slag has been ground, especially when a slag is bought on a guarantee of total phosphates. In such cases a guarantee should be given that at least 80 per cent. of the material will pass through the standard sieve 100E of Amandus Kahl, Hamburg. In fact, sellers are now often able to guarantee 85 to 90 per cent. of fine meal, and naturally preference should be given to such offers, other conditions as to the

solubility, etc., being equal. Where, however, slag is bought on a clear guarantee of citric soluble phosphate (as superphosphate is bought on a clear guarantee of water-soluble phosphate), the guarantee as to fineness of grinding is much less important. In Germany, where nearly all the slag is sold on the basis of citric soluble phosphate, a guarantee of fineness is thought unnecessary, and therefore is not given.

Essentials when Buying.

From the above remarks it will be seen that the important points in regard to basic slag are "solubility" and fineness of grinding. Buyers should, therefore, insist on a clear guarantee of—

- (1.) *a.* Minimum percentage of total phosphate of lime.
- b.* Minimum of at least 80 per cent. solubility in a 2 per cent. solution of citric acid.
- c.* Minimum of at least 80 per cent. of fineness, as stated in the note under fineness of grinding; or
- (2.) Minimum percentage of citric soluble phosphate of lime.

Above all, buyers should confine their purchases to sellers in whom the utmost confidence can be placed. This is important. As Dr. Dyer says:—"Purchasers should be strictly on their guard in purchasing slag from unknown vendors, for several instances have come under my observation in which ordinary iron slag containing no phosphates, and perfectly worthless as manure, has been palmed off for basic slag at a price sufficiently below that of the real article to tempt the unwary."

The Lime in Basic Slag.

There is no doubt that part of the favourable results obtained from the use of slag, especially on soils deficient in lime, is due to the proportion of lime contained in the slag. Speaking roughly, it may be said that every ton of slag has half its weight in lime, including a considerable percentage of free lime. Thus according to a recent analysis, a slag, 30 per cent. quality, contained:—

- Free lime, 11.14 per cent.
- Lime combined with the phosphoric acid as tetra-basic phosphate of lime, 22 per cent.
- Lime combined with silica, as silicate of lime, 10.13 per cent.
- Total, about 40 per cent. of lime.

All this lime is in an effective condition, available for the crop, and should certainly be taken into consideration when estimating the manurial value of basic slag.

High-grade and Low-grade Slag.

We do not see that there is any intrinsic difference in the merits of one grade of basic slag over another. What the farmer really has to look at is the cost per unit of the phosphate of lime soluble in the 2 per cent. solution of citric acid.

Let us take recent quotations in the *Mark Lane Express*:—

30 per cent. is quoted at 35s. at inland works.

35 per cent. is quoted at 43s. at inland works, both with 80 per cent. solubility, so the

30 per cent. will contain 24 per cent. soluble, costing per unit 1s. 5.5d.

35 per cent. will contain 28 per cent. soluble, costing per unit 1s. 6d. So that in these quotations we should give the preference to the lower grade.

It may be argued that the cost of carriage and application of the higher grade is relatively less; but, on the other hand the lower grade usually contains more lime, and by putting on a larger quantity of the lower grade more lime is applied—a matter of importance on many soils.

In general, it may be said that in consequence of the greater solubility and finer grinding obtained in recent years, the range of usefulness of good slag has become wider, and it is now being used on soils and crops for which until recently it was not considered suitable.

Soils most suitable for Basic Slag.

Lands of a peaty character, rich in organic matter, are specially benefited by applications of slag; and as it contains a certain quantity of free lime its action on heavy stiff clay soils is very beneficial, as it helps to disintegrate the soil and make it more friable, at the same time liberating a proportion of the natural potash in which most clay soils abound. On all kinds of pasture lands, and on poor hill pastures, it can be used with great advantage. On light soils the addition of potash is usually necessary.

On soils subject to "finger and toe" it should always be given the preference for roots.

Mixing Slag with other Chemical Manures.

Basic slag must not be mixed with sulphate of ammonia, guano, sewage, dried blood, or fresh blood, as a part of the ammonia contained in these various manures will be liberated by the lime in the basic slag, and pass off into the air, and thus be lost.

Basic slag may, however, be mixed with nitrate of soda, bone meal, and potash salts. When mixing with kainit, 2½ per cent of dried peat (peat moss litter in a fine condition) should be added, unless the mixture is made shortly before application of the manures to the land. The peat prevents the mixture from clogging.

Price for Coming Season.

What is going to be the price of basic slag during the approaching season? There has been a question whether, in view of the great demand for slag, and the enhanced value of some other important phosphatic fertilisers, it would not be proper to ask a higher price, but we are informed by a reliable authority that the most important sellers have decided not to advance the price, at any rate for the present.

This is satisfactory, because farmers are not in a position to pay more than hitherto, and if the market were disturbed by an advance in price it would tend to restrict the employment of a very valuable fertilising material.

Order Early.

We are informed that dealers and merchants are now making arrangements for their supplies, and we would recommend farmers to place their orders at an early date. In the course of the season there will be the usual

rush of orders and the usual annoying delay in getting delivery of the slag. "First ordered" will be "first delivered."

General Information.

Basic slag, as a cheap source of phosphoric acid, can be applied with advantage to all crops, but it is pre-eminently useful for the improvement of poor pasture on heavy lands, and for roots on soil lacking in lime. For pastures on light soils a joint application of slag and kainit, in the proportion of about 2 to 1, is recommended.

The following extract from the admirable lecture on "Artificial Fertilisers: their Nature and Function," read by Mr. Hall, Director of Rothamsted Experimental Station, will interest our readers:—

"The immense success of basic slag has in this country been mainly due to its special power of improving a particular class of poor grasslands on clay. The soils of these clays are naturally lacking in both phosphoric acid and carbonate of lime, and when they have been long down to grass they become covered with a thin poor herbage of 'bent' grass (*agrostis*), which creeps along the surface in straggling tufts and affords very poor grazing for any kind of stock. Farmyard manure and almost any form of nitrogenous fertiliser have no good effects, often an injurious one, but the summer following a dressing of basic slag the whole pasture becomes covered with white clover, small plants of which had previously been living stunted beneath the bents. Stock now graze the land with great relish, and the vegetation year by year improves, the *agrostis* giving place to clovers and other grasses of better character. One of the great factors in this change is the lime in the basic slag. It renders available some of the reserves of potash and nitrogen in the soil, and of the latter there is a great accumulation in any old pasture. Both by its alkaline reaction, its liberation of potash, and the aeration it induces by flocculating the clay when some of the lime is washed into the soil as calcium bicarbonate, it aids the phosphoric acid to render the soil favourable for the growth of leguminous plants, hence the sudden appearance of the hitherto dormant white clover. The white clover is always closely grazed, and as it collects nitrogen from the atmosphere, the whole herbage on the land, grasses as well as clovers, is improved year by year.

"On some soils it is well-known that basic slag has no visible effect, there is neither the general improvement in the growth of the grass, nor the sudden appearance of white clover which leads to the permanent enrichment. There are the three factors which may be operative in bringing about this comparative uselessness of basic slag. In the first place, on some soils the dormant plants of white clover do not exist, or are present in such small numbers as to be inappreciable in the first year or two following the application of the manure. As Professor Middleton has shown, it is necessary in these cases to follow up the application of basic slag with a seeding of white clover, harrowed into the land.

Importance of Potash with Slag.

"Secondly, on sandy soils, with little clay in their composition, there is no reserve of potash compounds to be rendered available by the lime of the basic slag; the Rothamsted experiments show very clearly that it is potash which pushes on the clovers in grass land, and that phosphates do very little for them in the absence of lime, hence when basic slag can act only as a

phosphatic manure it will benefit leguminous crops but little. In such a case potash manures must be used with the basic slag. Lastly, the visible effects of basic slag are always smaller on land newly laid down, simply because there is not the accumulation of nitrogenous material from past crops which characterises old grass land. The lime in the basic slag renders some of this reserve material available for the herbage, the increased supply of nitrogen being apparent in the fuller green the grass assumes.

"It should not be supposed, however, that in any of these cases the basic slag is without value because its application is not visible; phosphatic manures never have the effect upon the growth and colour of the crop which nitrogenous manures have, so that they can only be properly judged by the weight and quality of the crop at harvest time."

RECENT DEVELOPMENTS IN WHEAT BREEDING.*

Mr. F. E. Lee, Agricultural Superintendent of the Victorian Department of Agriculture, writes in the *Journal* of that State, on recent developments in wheat breeding, and gives much valuable information on that important question. He says:—"It is somewhat singular that under the conditions which exist in Australia, and Victoria in particular, the contribution of Australia to the world's wheat supply is only about two per cent. of the amount annually produced. There is, perhaps, no agricultural industry in Victoria which directly engages a larger number of persons than the business of wheat growing, and yet, according to the following figures of the Government Statist, the average returns can only offer a moderate return of the capital involved.

Average Wheat Yield per acre for Principal Countries of the World.

Country.	Yield per acre in bushels.	Country.	Yield per acre in bushels.
United Kingdom ...	30·85	Spain ...	12·98
Germany ...	28·24	Italy ...	12·75
Canada ...	19·47	India ...	11·45
France ...	19·22	Argentina ...	10·65
Hungary ...	17·54	Victoria (1904-8) ...	10·55
Austria ...	17·34	Russia ...	10·01
United States ...	13·07		

Average Wheat Yield per acre in Victoria for Ten Years.

1899 ...	9·09 bushels	1904 ...	14·49 bushels
1900 ...	7·04 "	1905 ...	9·26 "
1901 ...	8·85 "	1906 ...	11·31 "
1902 ...	6·91 "	1907 ...	11·13 "
1903 ...	1·29 "	1908 ...	6·55 "

Accepting the above official figures, which show the average wheat yield per acre for the past ten seasons, as being accurate, we must resolutely face

* Paper read at the Sixth Convention of the Victorian Chamber of Agriculture, held June, 1908, at Geelong.

the fact that the production of wheat in Victoria from a large area can barely pay the expenses of sowing and harvesting. Regular yields of 5, 6, or 8 bags per acre are by no means uncommon in many districts, which goes to show that either the seasons must be held entirely responsible for the low average yields, or else the methods of cultivation in a number of cases are not up to the standard they should be.

Improvement in cultivation methods.

Recognising that the difference between various systems of working land cannot be demonstrated in a season or two, the Department some four years ago instituted a series of 26 experimental fields, each of ten acres, embracing representative wheat-growing districts, from the Western Wimmera to the North-East. Upon these fields such important trials as subsoiling, rotative cropping, and the effects of continuous use of artificial manures, are being carefully noted from year to year. Three crops have already been harvested and a portion of the land is sown at the present time. While yet too early to make authoritative announcement on the subject, there are indications which point to the fact that a deeper system of cultivation on stiff clay soil permits more prompt and regular germination of seed, and at the same time stimulates the yield of wheat. When it is remembered that the cost of the extra amount of labour required for subsoiling is distributed over four or six years, and that the producing power of the soil is improved thereby, it can be shown to be economical to practise subsoiling on portion of the land cropped annually. Another important point is that subsoiled land appears to be capable of producing an equivalent amount of wheat with a smaller application of artificial manure. I do not desire to make alarmist statements, but I am convinced that any serious departure from the present system of combined sheep and grain farming, now almost generally adopted, must inevitably lead to an increase in the amount of artificial manure required and a corresponding increase in the cost of wheat production. The beneficial effects of crop and stock residues on the northern soils cannot be over-estimated, because it is largely upon the capacity of these soils to retain moisture that the success of wheat farming depends.

Rotative methods of Cropping.

In addition to improved methods of handling the soil, a partial solution of the main problem may be found through the introduction of a system of rotative cropping, modified to meet the special climatic conditions of the north, and to fit in with the circumstances of the individual farmer. Sheep and wheat farming have become so closely associated in Victoria that it goes without saying that any rotation of crops in the north must be designed to serve the purpose of sheep feeding. With that object in view, crops of rape and peas both for feeding off and ploughing in as a green manure have found a place in the experimental fields. A crop of mixed oats and peas, which will be subsequently cut for hay, occupies the land at the present moment, the same land last year being under wheat. The benefit of such crops as rape and pease is three-fold: besides providing feed for sheep, the soil's store of nitrogen is replenished by the latter crop, while the tap roots of both crops named are of great value in opening up the tenacious clay subsoils, and setting free plant foods previously little drawn upon. The results of these experiments will, I am sure, be watched with great interest; and when the

experimental term of seven years is ended there should be an accumulation of useful facts at the service of the wheat grower.

Improvement of Seed Wheat.

Improved cultivation methods and mixed cropping have been fairly universal during the past few years, and yet the statistics show that there has been a regular decline in the yield of wheat since the good crop following the drought in 1902. It may satisfy some people to say that the seasons have been getting worse since 1903, but I cannot convince myself that such is the real cause, and, moreover, the rainfall records in northern Victoria during the past four or five years do not bear out that contention.

The opportunity of seeing wheat farming in every district of the State has inclined me to the belief that part, at least, of the reason of the low average yield per acre can be traced to the seed itself. I may say that I am a firm believer in the grading of all wheat for seed purposes, and use none other than graded seed on the Government Experimental Fields. I attribute a large portion of the success which has attended these fields to the prime sample of grain sown. There is, however, a limit even to the usefulness of graded seed, and beneficial as it may be, it is of only minor assistance if the seed itself does not belong to a prolific yielding family.

Characteristics of Wheat Varieties.

Wheats belong to well defined families or groups, just as stock does. In horses some classes are remarkable for speed or strength, as the case may be; cattle are specialised for milk production or beef; and, I say with all the emphasis I am capable of, that the wheat grower who continues to sow a variety more suited to hay production than to grain must not expect maximum yields. I am well aware that the necessities of the wheat farmer compel him to utilise portion of his wheat crop for hay, but as I assume most wheat farmers put the crop in primarily for grain, does it not appear only logical that those varieties which have proved themselves prolific yielders should be preferred to the combined hay and grain variety? Portion of the experimental fields already referred to has each year been devoted to the trial of a number of varieties side by side, under identical conditions. From three years' trials one variety in particular has emerged triumphant as regards yield—I refer to Federation, which I may claim to have introduced to the Wimmera and Mallee by means of the experimental fields.

All the well known varieties grown by farmers were pitted against the Federation last season, with the result that in almost every instance the Federation proved superior as far as yield of grain is concerned. It is only to be expected that some districts and some types of soil will eventually show a preference for certain varieties of wheat, and, in fact, this has already been indicated in a few of the earlier districts. Besides the now familiar Federation, no less than fourteen other wheats grown upon the Government plots have shown themselves superior in yield to the ordinary seed supplied by the farmer. The experimental fields, then, can claim to have already done fine service in introducing new varieties of wheat and affording excellent opportunities for the comparison of yields, characteristics, etc. It must be confessed however, that they can only be regarded as useful for demonstration purposes, and in no way do they afford an opportunity for scientific research.

Stud Wheat Plots.

The Minister for Agriculture (Hon. G. Swinburne, M.L.A.), has recently approved of a scheme which has for its object the breeding of new wheat varieties to meet the especial conditions of soil and climate prevailing in Victoria. No longer, it is hoped, will the Victorian wheat farmer have to be dependent upon the enterprise and skill of the wheat experimentalists of South Australia and New South Wales. A committee known as the Wheat Improvement Committee, consisting of the Director of Agriculture; Mr. Pye, Principal of Dookie College; Mr. McAlpine, Government Vegetable Pathologist, and myself, has been constituted with power to initiate and carry out from year to year the practical work of breeding new wheat varieties. An area of 50 acres at Longerenong College, near Horsham, will serve the interests of the Wimmera; while 10-acre breeding stations at Dookie College, the Rutherglen and Wyuna Government farms will meet the needs of the North-Eastern, Goulburn Valley and Northern plains wheat farmers. The areas mentioned have already been sown with a number of pure strains and crossbred varieties procured from adjoining States, and abroad, as well as a large number of crossbreds created by Mr. Pye. An officer skilled in the work of crossbreeding wheat, oats, and barley—until recently in the employ of the Government of New South Wales, at the Experimental Farm at Cowra—has been appointed to carry out the necessary field work in the Wimmera, while the valuable assistance of Mr. Pye will be sufficient to insure the success of the same work at Dookie. It is not intended that the new wheats thus created shall be handed on to the farmer until they have undergone a searching test over a large area, under ordinary field conditions at one of the Government farms. The best, and only the best, will be put on the market, and farmers securing a small portion of these new wheats, later on, will be safe in the knowledge that they have been well tried before being recommended. New wheats are not created in one season, and it may be a year or two before the new creations are sent out. I can only counsel patience to those who are desirous of securing a small amount for trial purposes.

Systematic Testing of the Milling Properties of Victorian Wheat.

Associated with the scheme for the improvement of the yielding properties of wheats, provision has been made for the systematic testing of the milling qualities of all varieties grown in the State. Arrangements have been entered into for the erection of a miniature flour milling plant, capable of turning out a commercial grade of flour. During the coming season bushel samples of every variety grown in the State, and from a wide range of soils will be collected and subjected to the milling test with a view of ascertaining which are the most serviceable varieties for flour manufacture, and also to note the effect that the soil and manure have upon the milling value of the grain. As far as is known, no such far-reaching scheme as outlined has ever been carried into effect in any country in the world.

The New South Wales Agricultural Department has done magnificent service through the agency of the late Mr. Wm. Farrer, and Mr. F. B. Guthrie, in making known the yielding and flour making properties of wheat; but the experiments have not, so far, embraced such wide objectives as the scheme it is intended to conduct in Victoria. It may be further added that the flour obtained from the milling test will be submitted to manufacturing bakers

to be turned into bread, so that nothing will be left undone to make the investigations of the highest value to the farmer, the miller, and the baker.

The subject is, to me, of such absorbing interest, and the possibilities of bringing about an increase in the monetary return from wheat growing of such powerful importance to the State, that the delegates representing wheat growing centres have the right to know the steps which are being undertaken by the Department of Agriculture to insure a permanent improvement in the State yield of wheat. So far as enthusiasm and skill can go, the Wheat Improvement Committee will leave no stone unturned to probe the whole question to the bottom, with the hope of establishing sound facts for the future guidance of the Australian wheat farmer.

RABBIT DESTRUCTION.

THE RODIER SYSTEM.

At the annual conference of the Farmers' and Settlers' Association, held in Sydney in July and August last, Mr. Wm. Rodier, founder of the system bearing his name for destroying rabbits, gave an address on the merits of his method. He said:—

That he was very grateful for the opportunity of addressing so large a gathering of farmers and settlers assembled in conference. He was thoroughly sincere in the scheme he proposed. As an indication of his *bona fides* he might mention that the people in the Cobar district had presented him with a gold watch some three months after leaving the district. That was the best guarantee he could offer of his honesty of purpose and integrity.

For twenty-seven years he had been in Cobar district, and had camped in a tent when rabbiting. From statistics he had carefully compiled during a period of sixteen years, while in that part of the country, he proved that 64 males was the average to every 100 females in the rabbit world. It was said the Labour Party opposed rabbit destruction, but he understood they opposed merely the introduction of a foreign virus which might do injury to other animals and not prove effective for rabbits. As against the gain of £500 worth of skins per annum, and less than £2,000 yearly paid in wages in the industry, there was to be taken into consideration the great loss in stock to the country. In the years 1886 to 1891 the average number of sheep in Cobar district was 1,488,649; in 1903 to 1907 the yearly average fell to 419,375. Taking the loss of over a million sheep per annum, through the presence of rabbits, that meant one-third would be ewes, which would yield at least 70 per cent. per annum of lambs, totalling 249,000. If the loss of a million sheep were put at 5s. per head it would amount to £250,000 yearly. By his experiments he had proved that while on the one side of a fence where the grass was good the attempts at destruction by other plans left the rabbits still breeding with litters of seven and eight, and numerous young ones sporting about the burrows, on the other side of the fence, where he had experimented, there was not a rabbit to be found in young, though the grass

in that portion was better still. He had actually seen the male rabbit killing the female, and where scores of rabbits were dug out there would be only one little one. What he desired was that the Farmers' and Settlers' Association should give the benefit of their influence in getting for the Rodier system a fair trial. In order that those with very large areas should not be able to find fault with a trial in a limited area, his idea was to raise a sum of £10,000 to purchase some abandoned property in the western division; £5,000 of that amount to be contributed by pastoralists, and £5,000 as a pound for pound subsidy from the different governments of Australia. He had already received promises of as much as £600 from pastoralists, and had visited South Australia and Queensland, where he hoped to receive much assistance towards the project in hand. It was possible to have the matter floated into a company, and having raised the necessary funds a thorough trial could be made. The simple remedy for the rabbit pest—as he could demonstrate—was in securing an excess of male rabbits over females.

In answer to a question, Mr. Rodier said he had tried other plans that were put forward but without success. Under natural conditions a buck rabbit would live about eight years. Asked as to whether he thought the Yalgogrin microbe would prove effective, he said he did not wish to say anything about a rival scheme. He would, however, say that he had put forth a challenge that his system was more effective than any other system in the whole world to-day. More than that he would be prepared to put up £500 to £250 that in the next three years no superior scheme could be found, the winner to take the money at the end of that time.

A vote of thanks was accorded Mr. Rodier for his interesting address.

When the conference assembled after luncheon it was resolved:—

"That the Rodier system for the destruction of rabbits be given a fair trial."

Mr. T. I. Campbell read a letter from Tyree, Limited, offering to undertake the destruction of rabbits, or to purchase rabbit-infested properties.

THE PEST IN CALIFORNIA.

A special despatch to the *San Francisco Chronicle* from Los Angeles, states that jack-rabbits are so thick in the Antelope valley that the ranchmen are almost in despair. The animals are becoming so fierce that they are actually breaking down the fences around the adjacent fields and eating the stuff down to the roots. Not content with this, they are swarming into the desert towns and invading the front yards of the dwellers.

The citizens of Lancaster turned out one day and made a round-up. They put a fence across the road between fences surrounding fields on either side, and in a short time drove in and killed with clubs over 500 jack-rabbits. So many rabbits have been shot in the vicinity that the stench is becoming unbearable, and the inhabitants are working hard to bury them in pits.

The people of the valley are considering the advisability of inviting Los Angeles to join in a general round-up. They think several hundred men and boys on horseback might be able to kill 40,000.

CALF PENS AT BRUNSWICK STATE FARM.

When a number of calves are penned together and fed from the one trough, the stronger often rob the weaker animal ; the habit of sucking becomes contagious and much trouble is experienced by the attendant in charge.

With a view of keeping the calves at the State Dairy Farm under better control, a conveniently designed calf house with stalls was designed. Width of stalls 15 inches, total length of stalls, 5 feet 6 inches. A shelf in front receives milk buckets made of empty kerosene tins.

The accompanying plans represent these calf-pens. They are adopted from designs of similar structures which were given in the *Victorian Journal of Agriculture*, with modifications suggested after a visit to Mr. T. Hardwick's Farm at Waroona.

The plans explain themselves, but the main details are as follows:—The building is built of timber, and in dimensions is 36 feet by 30 feet; posts, 4 inches by 4 inches ; rafters, 5 inches by 2 inches; battens to take iron of roof, 3 inches by 2 inches; same on the sides, 4 inches by 2 inches. The plan shows how these are placed. The floor is bricked and tarred with sufficient slope from the centre towards the sides. There is accommodation provided for forty-four calves, with a passage way of four feet and space behind the pens of 7 feet 6 inches.

The side elevation timbers are as follows:—Bottom plate, 4 inches by 3 inches; top plates, 5 inches by 2 inches; studs, 4 inches by 4 inches; rafters, 5 inches by 2 inches; battens, 3 inches by 2 inches; stays, 3 inches by 1 inch; pitch of roof, 4 feet 6 inches; iron of walls, 7 feet; roof iron, 9 feet, two sheets; louvres, 2 inches by 4 inches; doors, 4 feet wide.

ENGLISH MARKETS FOR POULTRY.

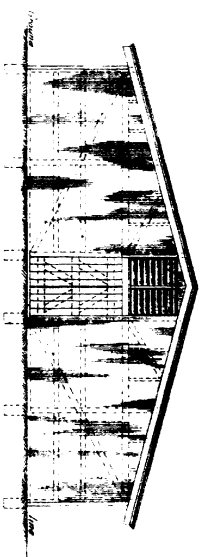
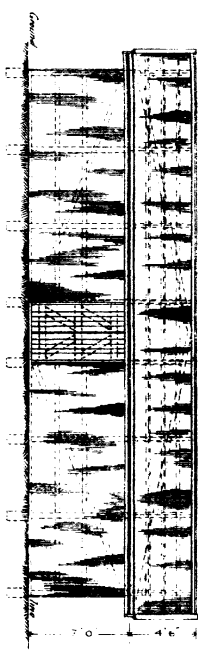
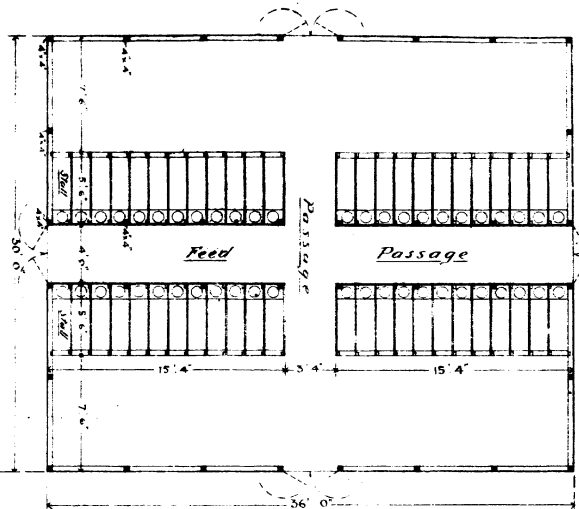
Mr. P. G. Wicken, Officer-in-charge of the Western Australian Court at the Franco-British Exhibition, has forwarded a letter received from Messrs. Lapraik, Stuart, & Co., of 9 Mincing Lane, London, giving an outline of their method of doing business with Canadian shippers of poultry, which information can be of use to persons in Western Australia. The produce consigned to the firm, c.i.f., London or European ports, is, on arrival, immediately disposed of if the market is favourable. If prices are against sellers, the product is placed in cold storage to await a better time for selling.

Shippers can draw on the firm up to 75 per cent. of value, the balance being remitted by first mail after disposal, less the usual brokerage.

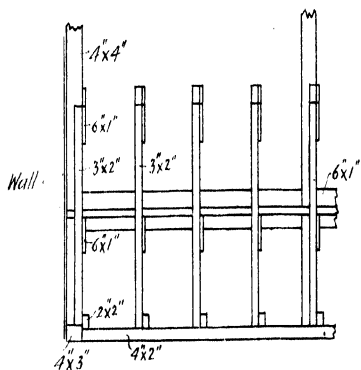
Messrs. Lapraik, Stuart, & Co.'s offices are advantageously situated in the centre of the different markets.

Calf Shed

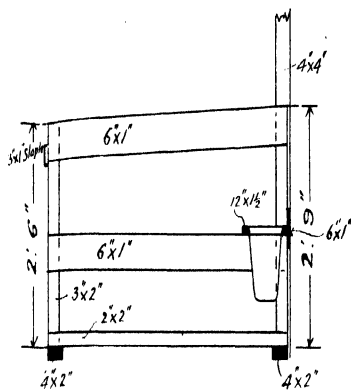
Scale - 10 feet to 1 inch



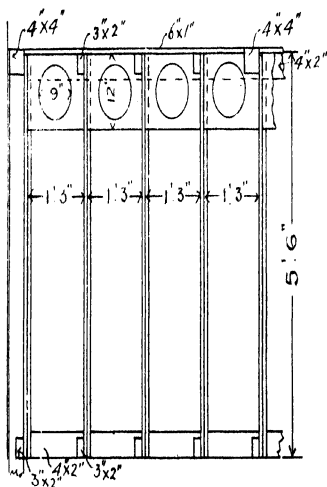
Detail of Calf Stalls



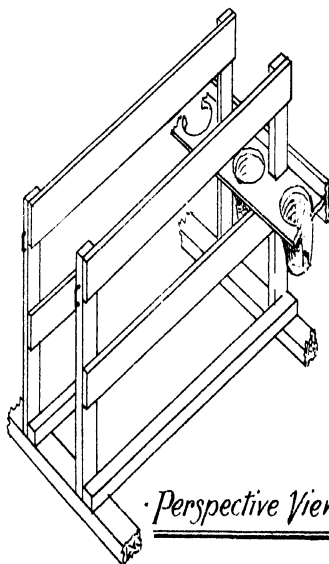
· Elevation ·



· Section ·



· Plan ·



· Perspective View ·

1/2" Scale.

FRANCO-BRITISH EXHIBITION.

WESTERN AUSTRALIAN AWARDS.

The Agent General has forwarded the following details of awards secured by exhibitors in the Western Australian Court at the Franco-British Exhibition. A more recent cablegram, however, stated that up to that date, 91 awards had been secured by this State. Fuller particulars, therefore, should be forthcoming. The details are:—

Class 35.—Statistical shields, silver medal.

Class 39.—Government Farm, Perth, collection of grain and hops, grand prix.

Piesse, Katanning, gold medal for wheat.

T. Evans, Koombekine, gold medal for wheat.

Chapman State Farm, gold medal for wheat.

Class 41.—Bee Co., Guildford, gold medal for honey.

Government exhibit of honey, grand prix.

The following received gold medals in Class 42:—A. H. Smith, Baker's Hill; Wishart, Wooroloo; Lead and Layton, Donnybrook.

Class 56.—Padbury, Guildford, silver medal for flour.

New Norcia Mission, silver medal for macaroni.

Gillespie, Northam, silver medal for flour.

Piesse, Katanning, silver medal for flour.

Western Australian Government, gold medal for flour.

Harvey and Edwards, York, gold medal for flour.

Class 58.—C. and F. Dawe, preserved sea mullet and herring, silver medal.

Tuckey Bros., preserved sea mullet and herring, silver medal.

Mr. P. G. Wicken, Officer-in-charge of the Western Australian Court, in his report for the fortnight ended October 1, writes:—"The attendance during the last fortnight has fully kept up to the average, if not somewhat exceeded it. The number of people who are going to Australia as the result of the Exhibition is very large. Nearly every day one or two people who have been visiting the Court and making inquiries come in to tell me that they have made up their minds and are leaving shortly. All the available accommodation in the liners has been taken up, and it is now impossible to obtain a passage between this and the end of the year.

The Premier (Hon. N. J. Moore) has received the following list of further awards gained by Western Australian exhibitors at the Franco-British Exhibition:—

Hors Concours.—Collection of Products of Fishing—Western Australian Government.

Grand Prix.—Wood Carving and Carpentry (children)—The State primary schools, Western Australia. Drawings—Perth Technical School. Maps, Railway Exhibit, Drawings of Public Works, Diving Apparatus, Vegetable Food Products, Honey and Timber—The Government of Western Australia. Paintings of Wild Flowers—Mrs. Dorrington. Stuffed Animals and Birds, Minerals and Ornamental Joinery—The Government of Western Australia. Ornamental Joinery—W. Howitt. Oils and Chemicals, Inkstand and

Native Apples, and Wheelwrights' Work—The Government of Western Australia.

Diploma of Honour.—Driving Dress—Heinke and Co. Saddlery—B. Rosenstamm. Cotton—State Farm, Hamel. Wool—Ross Anderson, Government of Western Australia, and A. W. Hassell. "Southern Cross" Pearl—Peto Bennett. Art Drawings—Perth Technical Schools. Wheelwright's Work—G. Glasser.

Gold Medals.—Photography—Messrs. Greenham and Evans. Wheelwright's Work—W. H. Lang. Guano and Statistical Shields—The Western Australian Government. Wheat—F. and C. Piesse, T. Evans, and State Farm, Chapman. Wool—The Government of W.A., T. Withnell, Mr. Sep. Burt, S. R. L. Elliott, W. McKenzie Grant, C. K. Davidson, and Withnell Bros. Honey—F. Wishart, A. and H. Smith, and Mead and Layton. Timber—W. H. Lang and H. Wills and Co. Native Weapons—The Government of W.A. and the W.A. Museum. Flour—The Government of W.A., Harvey and Edwards, W. Padbury, New Norcia Mission, Jas. Gillespie, Ltd., F. and C. Piesse, and C. W. Ferguson. Wine—F. and C. Piesse. Carved Chair—W. Madeley.

Silver Medals.—Phosphates, etc.—Government of W.A. Wheat and Other Grain—Campbell and Robertson, S. Grigson, J. Shields, Farmer and Meldrum, L. Whitehead, B. Matthews, H. Beck, S. R. Fisher, H. J. M'Dougal, Marwick Bros., State Farm, Hamel, State Farm, Narrogin, and Walker Bros. Collection of Fruit—Government of W.A. Pressed Wild Flowers—Miss Babbington. Collection of Stuffed Birds—I. Cunningham. Collection of Stuffed Animals—O. Lippert. Preserved Fish—C. and F. Dawe and Turkey Bros. Wine—Santa Rosa Wine and Distilleries and Coorinja Vineyards. Ornamental Furniture, etc.—S. Cook and Whittaker Bros. Olive Oil—New Norcia Mission.

Bronze Medals.—Sponges—Captain Armstrong. Pearlshell—Captain Biddles. Wine—J. Duce. Eucalyptus Oil—A. D. Mitchell. Leather—B. Rosenstamm. Brushware—W. A. Brushware Company.

Honourable Mention.—Snuff—New Norcia Mission. Silversmiths' Work—W.A. Government and G. L. Gorer and Co.

Western Australian Government, thermit welding process, gold medal. Acme Paving Co., collection of paving blocks (jarrah), gold medal. Millars' Karri and Jarrah Co., collection of jarrah railway sleepers, gold medal.

Fruit awards.—Government of Western Australia, apples, pears, grapes, oranges, mandarins, and rasins, Grand Prix. G. Barrett-Lennard, grapes, gold medal. W. Sounness and Son, pears and apples, gold medal. T. Walters apples, gold medal. T. Price, apples, gold medal. W. Keal, apples, gold medal.

Perishable produce award.—Bunbury Co-operative Butter Factory, fresh butter, gold medal; salt butter, gold medal.

Minerals.—Western Australian Government, collection of minerals, Grand Prix. The Great Boulder Proprietary Gold Mining Co., Grand Prix. Johnson and Sons' Smelting Works, Ltd., collection of minerals, Grand Prix. Pilbara Asbestos Co., collection of asbestos (chrysolite), Grand Prix. Council of Western Australian Mineowners, models of gold output, Grand Prix. Mr. A. E. Thomas, collection of specimens (auriferous quartz), gold medal. Mr. F. Rhys, collection of auriferous quartz, gold medal. Western Australian Museum, collection of rocks and minerals, gold medal.

PROGRESS OF AGRICULTURE IN THE STATE.

The Government Statistician, Mr. Malcolm A. C. Fraser, has prepared a report showing the area in the State cleared, under crop, etc., during the season ending the last day of February, 1908, and the corresponding figures for the previous season. The following is a summary:—

Under crop : 1907, 460,825 acres ; 1908, 494,987 acres ; increase, 34,162 acres.

Under permanent artificially-sown grasses : 1907, 6,787 acres ; 1908, 7,990 acres ; increase, 1,203 acres.

New ground cleared during season and prepared for next season's crops : 1907, 109,731 acres ; 1908, 139,430 acres ; increase, 29,699 acres.

Land in fallow : 1907, 118,600 acres ; 1908, 152,175 acres ; increase, 33,575 acres.

Area of other cleared land previously cropped now used for grazing or lying idle : 1907, 222,655 acres ; 1908, 287,535 acres ; increase, 64,880 acres.

Ringbarked or partially cleared land : 1907, 2,145,437 acres ; 1908, 2,399,001 acres ; increase, 253,564 acres.

Total : 1907, 3,064,035 acres ; 1908, 3,481,118 acres ; increase, 417,083 acres.

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GOVERNMENT LABOUR BUREAU.

OPERATIONS DURING OCTOBER.

The Superintendent of the Government Labour Bureau (Mr. James Longmore) reports on the operations for the month of October as follows:—

Perth.

Registrations.—The total number of men who called during the month in search of work was 715. Of this number 378 were new registrations and 337 renewals, i.e., men who called who had their names registered during the months of July, August, and September. The trades or occupations of the 715 applicants were as follows:—Labourers, 225; handy men, 80; handy lads, 61; farm hands, 48; cooks, 37; carpenters, 18; grooms, 17; gardeners, 17; shearers, 16; bushmen, 15; hotel hands, 12; painters, 12; clerks, 11; miners, 11; bakers, 9; blacksmiths, 8; engine-drivers, 8; butchers, 7; drivers, 7; station hands, 7; bricklayers, 6; caretakers, 6; orchardists, 5; strikers, 5; yardmen, 5; fitters, 4; orderlies, 4; plumbers, 4; dairymen, 3; kitchenmen, 3; plasterers, 3; printers, 3; and 38 miscellaneous.

Engagements.—The engagements for the month numbered 210. The classification of work found was as follows: Labourers, 36; farm hands, 34; handy men, 27; handy lads, 18; shearers, 12; cooks, 11; sawmill hands, 10; lads for farms, 9; woodcutters, 7; bushmen, 6; miners, 5; carpenters, 4; hotel hands, 4; carpenters (rough), 3; clerks, 3; dairymen, 3; fencers, 3; kitchenmen, 2; orchardists, 2; survey hands, 2; and 9 miscellaneous.

Kalgoorlie.

Registrations.—The new registrations were 23, and renewals 26; total 49. The classification was:—Handy men 14; labourers, 13; handy lads, 9; engine-drivers, 4; blacksmiths, 3; butchers, bakers, barmen, carpenters, grooms, and painters, 1 of each.

Engagements.—There were six engagements, classified as:—Engine-drivers and labourers, 2 of each; handy lads and painters, 1 of each.

The female servants who called numbered 22. The classification was:—Generals, 7; cooks, housekeepers, laundresses, and waitresses, 3 of each; barmaids, charwoman, and useful girls, 1 of each.

Northam.

Registrations.—The applicants for work numbered 22, classified as:—Farm hands, 14; handy men, 3; labourers, 2; clearers, 2; and shearers, 1.

Engagements.—The engagements were 11, viz.:—Farm hands, 6; clearers, 2; handy men, 2; and shearers, 1.

Women's Branch, Perth.

Registrations.—There were in connection with this branch 73 registrations and 66 renewals; total 139. The classification was:—Laundress-charwomen, 30; light generals, 25; housemaids, 24; cooks, 20; generals, 10;

housekeepers, 10; useful girls, 6; waitresses, 3; lady-helps, 3; nursemaids, 3; cook-laundresses, 3; married couple, 1; caretaker, 1.

Engagements.—The engagements numbered 50, classified as:—Laundress-charwomen, 21; generals, 8; light generals, 8; housekeepers, 4; useful girls, 3; housemaids, 2; cooks, 2; waitresses, 1; cook-laundresses, 1.

General Remarks.

The number of individual men who called at the central office, Perth, during the month for work was 715. This total is three short of the number for October last year. The engagements by private employers reached 210, this being 3 in excess of the number for the corresponding month of 1907. During the month there were 74 men assisted by railway passes from the Perth office. The fares refunded totalled £46 16s. 4d., and the sum of £11 16s. 1d. was received from employers to send workers, the whole amounting to £58 14s. 5d.

RECIPES.

Tetanus in lambs.—Caused by tetanus germs coming in contact after castration. Dr. Bull (Melbourne University) advises as a prevention, the use of phenyle of the strength of one in forty immediately after castration. It should be applied very quickly in the same way that boys far cuts at shearing time.

Exterior abscess on animals.—Give a mild purgative made up of 12ozs. Epsom salts and $\frac{1}{2}$ oz. ginger, in gruel. Foment abscess with hot water and open it as soon as it is ready. A slight blister will help to bring it to a head if progress is slow. A convenient blister to use is 1oz. powdered cantharides in 8ozs. olive oil, mix these together in an earthenware pot, infuse for four hours and strain to make ready for application. When the animal is recovering give a tonic in a pint of warm ale or gruel, morning and evening.

Bacon curing pickle.—Prepare the pickle by boiling in 3 gallons of pure water—6lbs. rock salt, 2lbs. powdered loaf sugar, and 3ozs. saltpetre. Skim the liquid when boiling, and when cold pour over the meat, which should have been previously cleansed and all blood squeezed out of it. Hams will be ready in about four or five weeks, when they may be dried. Small pork will be cured in five or six days. This pickle may be used time after time, only you must always add a little to the ingredients every time you boil it up for use.

GARDEN NOTES FOR DECEMBER.

The exhibits of garden produce at the Royal Agricultural Show last month were much in advance of those at the previous year's show, and it was evident that more interest and attention had been bestowed in preparing exhibits, if not in the cultivation of vegetables of good quality. This fact gave a very pleasing aspect to the position of the industry, both present and future.

The operations for December are principally in the direction of keeping the ground worked and free from weeds.

French and Kidney Beans.—Mature pods should be picked before too old. Sow a few more rows for fresh supply.

Beet.—There will be a fresh lot of green leaves; others should be cut as they mature. The latter make a good vegetable, and also feed for poultry.

Cabbages.—Cultivate the ground around the growing plants, and put out more plants shaded from the sun.

Celery.—Hill up growing plants. Sow more in moist localities.

Cucumbers.—Sow a little more seed in moist plots. Check troublesome worms by laying pollard mixed with Paris green.

Egg Plants.—A few more seeds can be sown. Plant out available plants and shade well.

Maize (sweet).—Cultivate between the rows. More seed can be sown in moist ground.

Melons.—In early districts melons should be coming in. Keep the ground stirred until covered by the vines. This also applies to pumpkins and squashes.

Sweet Potatoes.—Last month's young shoots planted out should be doing well. A fresh lot can be put out protected by shade. Keep the ground stirred.

Tomatoes.—The market will be getting early fruit from warm districts. Plants can still be put out in cooler localities. Stake and keep off the ground.

FARM AND ORCHARD.

Farms are now getting busy. Hay-making is well advanced, and grain crops generally coming on for harvesting. Fire-breaks should be attended to.

French millet, cow-pea, sorghum, etc., can be sown where the soil retains sufficient moisture.

Sheep and pigs can be turned into the stubbles, much to the benefit of themselves and the land.

GOOSEBERRY MILDEW.

The dreaded American mildew has at length made its appearance in Great Britain. In Norfolk and Cambridgeshire hundreds of gardens are badly affected with the plague. Tremendous measures were taken to keep this unwelcome visitor out, but it has proved victorious, and presumably will be a permanent addition to the list of horticultural pests in England.

FLOWER GARDEN.

Canna, calceolarias, cinerarias, cyclamen, and others can be sown for early flowering. Dahlias and seedlings of summer annuals can be planted out and chrysanthemums be cut back early in the month. Keep down the caterpillars.

COLD STORAGE NOTES.

EXPORT LAMBS.

By A. D. CAIRNS, Examining Officer, Federal Commerce Act.

In the "Orient" shipment of nearly 1,600 lambs, which left Fremantle on the 26th October last, marked improvement was noticeable in the get-up from last year. Of course, there is a comparatively wide range of variety of lambs, going from 24lbs. to 42lbs. They were all this season's lambs, and mostly been fed on grass as well as mother's milk, and the dominant characteristics of the merino in their somewhat lengthy lean hindquarters were fairly evident throughout.

The lessons learned by last year have certainly developed very practical results, in reducing the multiplicity of brands and marks that was a noticeable feature in last year's shipments. The "Union" brand—1,186; the "J.L.B."—100; and "C.D.D."—399 were the totals for the shipment. Whatever the results may be, there is no question that by narrowing down the number of shippers in this manner defects will be more easily traced, known, and rectified.

There must always be certain disadvantages to shippers in loading what is practically a full ship, and the time the carcasses are exposed from the freezing chamber to the frozen hold of the vessel might be reduced with advantage to our commodities. It may look a trivial matter to see a sling containing forty lambs suspended in the air or lying on the wharf, exposed to the afternoon rays of an October sun, but the far-reaching results are, however, of more serious moment to the shipper. The thin flanks soon begin to soften; the open texture of the enveloping sheep-bag—cotton covering—is an ideal transmitter of heat, as well as a condenser of vapour, and the thawing, though only superficial, will have an ultimate result which will certainly not raise the price. Snow-stains, as they are called, are caused principally through frozen parts of the carcass being temporarily defrozen, and there is no mistaking them when once they develop. It is unfortunate that the final stages of our lambs in leaving the country should be the cause of lowering their value, as it is futile to expect that a course of hard freezing on the ship will conceal this from the practical eye of the cold storage man in London. Snow stains ultimately form a breeding ground for moulds, and should not occur when loading under favourable conditions demanded by the business. In these days of keen comparison of favoured breeds, it is interesting to note the increasing attention devoted to Mendelism:

all contributions of exact results from tabulated sources must **ultimately** improve the type, whether it be for mutton or for wool.

Tabulated results from South Australia show—

A pure-bred Dorset, age 22 weeks, dressed 56lbs.

Shropshire-Merino cross, 20 weeks, dressed, 44lbs.

Lincoln-Merino ewe and Shropshire ram, 22 weeks, dressed, 53lbs.

Weights so interesting are not everything, as the best weight in this lot—the Dorset lamb—showed heavy development on the shoulders, lack of development on the hindquarters, and was coarsely fleshed compared with the others. This, as is well known, is not payable, as hindquarters are always worth more than forequarters in any market. The experimenter in this instance comes to the conclusion that the best lamb to breed for export trade is the strain resulting from a cross between a Shropshire ram and a Lincoln-Merino ewe. Both these types are common enough in Western Australia, and fairly successful as far as things have gone.

Photographs herewith will show what practical growers have accomplished this season, and whether they base their experience on the deep mysteries of Mendelism, or the more practical study of local conditions where these lambs have been grown, it is quite evident from the photographs of the centre pair that a very high stage of perfection has been reached. The cry of the frozen lamb dealer is for something short-legged. The observer, by comparing the photographs on the extreme right (35lbs) and extreme left (42lbs.), which are a cross between a Merino and a Cotswold, will see that these are in sharp contrast to the two in the centre, which were 44½lbs. and 47 lbs. respectively, and are from a Southdown ram and a Leicester ewe. These carcasses, besides being an ideal model for a lamb-grower, also returned 2s. 8d. for their skins, whereas the outside pair returned 2s., 2s. 3d. for their skins, and were therefore obviously younger at the time of dressing.

These lambs were grown near Pinjarrah (so I am informed by Mr. Watson, of Forrest, Emanuel & Co., who had charge of the dressing), and if the thousands of lambs which go out of Western Australia annually were bred and fed in the same manner as the central types, a great future would be assured for the lamb industry. In noting the hind legs of these animals, strong contrast is observed in the triangular opening between the gambrel on which the lamb is hung and the crutch. In a long-legged animal this approaches a U diagram. On a properly developed and properly bred animal this approaches the V form.

The photograph of the left of the centre pair will give a diagram of outline seldom equalled and hardly to be excelled as a model for a lamb-grower's consideration to imitate, but at the same time it but poorly expressed the bloom, colour, and marling, as was seen after chilling, on the carcass itself. The whiteness of the fat in contrast to the appetising redness of the lean gave one the regret that such a toothsome looking comestible could not be found oftener in the local butchers' shops; but if we are to export any quantity, we must pay the penalty they had to pay in the other States—send our best out and make the best of our worst for ourselves.



MARKET REPORTS.**GENERAL SUMMARY.****FARM PRODUCE.**

New season's chaff has formed the principal supply since the beginning of the month, but with a lowered tone owing to imperfect curing or damage by wet weather. Prices ranged to £5 2s. 6d., £5 7s. 6d., and £5 10s. Lower grade wheaten was quoted at £2 15s. and £2 17s. 6d.

Very large supplies came to hand at later dates, and prices receded somewhat, and quotations reached £5 2s. 6d. f.a.q. £4 15s.; good medium, £4 7s. 6d.

The wheat market began the month at 4s. 0½d. and 4s.

Straw is reported scarce.

LIVE STOCK.

The market has been generally weak, with improving prospects for fat stock. Efforts are being made to establish metropolitan live stock sales at Midland Junction, which are regarded as certain to have a stimulating effect on local prices.

Sheep.—The following prices are reported:—store lambs 6s. 6d., sheep 10s. 1d. to 12s. 6d., store sheep 7s. 9d. to 9s. 6d., fat wethers 18s., wethers 13s., 1 cow £15, 150 lambs 11s., 113 ewes and lambs 16s., 1 gelding £20, 98 ewes and lambs 14s. 3d., 300 lambs 9s., 49 lambs 8s., rams 3 guineas.

Pigs.—Porkers, 20s., 35s.; light, 25s.; stores, 17s. 6d.

Horses.—Mare, £36 15s.; pony, £10; geldings, £52 10s., £27, and £32. Draught horses, £35 and £42; mediums, £29; light, £24; unbroken colts, £12.

Cattle.—Bullocks, ruling rates; cows, £9 10s.; heifers, £5 2s.

FRUIT AND VEGETABLES.

Fruit supplies have been medium. Vegetables and poultry have been well up to demands. Following are the prices prevailing:—Apples: Rome Beauties, dumps, 15s. 6d. to 17s. 6d.; Imperial Yates, 16s. to 18s.; other varieties, 14s. 6d. to 17s. 6d. Oranges: best Navel, dumps, 14s. 6d. to 17s.; medium, 12s. 6d. to 13s. 9d.; ordinary, 10s. 6d. to 15s. 3d. Passion Fruit, 14s. to 17s. 6d.; medium, 8s. 6d. to 10s. 6d. Strawberries, 10s. 6d. to 16s. 6d.; medium, 6s. 6d. to 8s. 9d. Lemons, best, 10s. to 14s. 6d. Cabbages, 3s. 9d. to 6s. 3d.; others from 2s. Pumpkins: Ironbark, 7s. to 8s. Peas, 1d. to 2d. Tomatoes, best, 15s. to 18s. 6d.; medium and inferior, 5s. to 10s. 6d. Cucumbers, 3s. 6d. to 6s. 9d.; medium, 2s. to 3s. Swedes, 8d. to 1s.; bulk, 3s. 6d. to 4s. Rhubarb, 13½d. Onions, 8s. 9d. to 11s. Potatoes, 9s. to 11s. 3d.

POULTRY, ETC.

Best table birds, 5s. to 7s. 6d.; medium, 4s. 6d. to 5s. 3d. Hens, 5s. to 6s. 9d. Ducks, 5s. 6d. to 8s. 6d.; Indian Runners, 4s. 6d. to 5s. 3d. Turkeys: Gobblers, best, 18s. to 25s.; hens, 11s. 6d. to 15s. 9d. Geese, 7s. 6d. to 9s. 6d. Pigeons, 2s. to 2s. 3d.

PROVISIONS.

Eggs: Locals, 1s. 1½d.; country, 1s. Pork, prime, 5½d. to 6½d. Veal, 4d. to 4¼d. Beef, 3d. to 4d. Lamb, 4d. to 5d. Honey, best clear, 10s. 6d. to 12s. 6d.

LONDON PRODUCE MARKETS REPORT.

Messrs. W. Weddel & Co. report as follows under date, London, October 9:

Wool.—The opening of the fifth series of Colonial wool sales brought together a large company of both home and foreign buyers, with a sprinkling

of Americans; competition started well, and continued so up to the date of writing.

Greasy merinos, when of good length and condition, have sold with great keenness, showing a slight advance. Good scoureds have not met with such a ready demand, and are lower by 5 per cent. Faulty merinos, in grease and scoured, show a like decline. Greasy crossbreds, in large supply, met an excellent market all through.

Offerings up to the 8th inst. comprise some 124,000 bales, including 50,000 bales from New Zealand, 65,000 from Australia, and 3,000 bales from South America. About 112,000 bales were sold.

For the sixth series of sales, which commence on the 24th November, the following quantities have arrived to date, viz.:—19,000 bales, of which 6,500 are from New Zealand, 10,500 from Australia, and the balance from South Africa.

English Wheat.—The country markets are now well supplied with new wheat, and prices are about 6d. per qr. lower. The average price last week of 31/7 per imperial qr. shows no change from the previous fortnight, but is 11d. per qr. lower than at the same time last year.

Australian Wheat.—*Ex Store*.—This cereal receives little attention, and prices remain unchanged at 40s. to 41s. per 496lbs.

Frozen Meats—General Market.—Trade at Smithfield was exceedingly quiet last week, when excessively heavy quantities of Continental meat arrived to be marketed during a period of unseasonably hot weather. During this week, however, supplies of Dutch mutton and lamb are less heavy, and there has been a marked and welcome improvement in the general tone at Smithfield. Home-grown mutton has well maintained its position at 6½d. and 7d. for Scotch, and 6d. and 6½d. for English. Ranch beef is plentiful, and quotations range between 3¼d. and 3½d. per lb. fores, and 4d. and 5d. per lb. hinds. North and South American chilled beef are maintained at a fairly high level. At Smithfield, States sides are realising 5½d. and 5¾d. per lb., but Canadian ranch sides are offered at 4¾d. and 5¼d. At Deptford, States cattle are quoted at £17 and £22 per head, and Canadian at £14 and £21 per head.

An attempt is again being made to firm up the price of mutton, and is meeting with some success. Frozen lambs are in short supply, and are firmly held for higher prices. Notwithstanding fairly large marketings of chilled beef, including a considerable portion of ranch beef of inferior quality, values of frozen fores are maintained though hinds are slightly cheaper.

Mutton—Australian.—During the past fortnight arrivals amount to 26,505 carcasses. There has been a better inquiry for this class of mutton.

Lambs.—Arrivals for the fortnight from Australia total only 18,082, and from New Zealand, 104,620. The demand at Smithfield is not active, but there is good inquiry for lambs in store and to arrive. Australian are quoted at 4½d. and 5d. per lb.

STOCK SALE, BRUNSWICK STATE FARM.

The first of a series of annual live stock sales was held at the Brunswick State Farm by the Department on Tuesday, 17th instant. The attendance of buyers was good and much interest displayed in the event. Satisfactory prices were realised for the various lots catalogued.

Demonstrations in irrigation, silage, and dairy work were given. A detailed account of the sale and proceedings will appear in the December issue of the *Journal*.

Rainfall for the month of October, 1908, recorded at telegraphic stations in Western Australia, and averages.

STATIONS.	Total for October, 1908, in points. 100 points=1in.	No. of wet days.	Average for October.	STATIONS.	Total for October, 1908, in points. 100 points=1in.	No. of wet days.	Average for October.
TROPICS :				NORTH COOLGARDIE			
Wyndham ...	Nil	...	58	FIELDS :			
Turkey Creek ...	4	1	49	Sandstone ...	21	2	...
Hall's Creek ...	Nil	...	40	Wiluna ...	3	1	15
Fitzroy Crossing ...	Nil	1	15	Mt. Sir Samuel ...	7	1	20
Derby ...	3	1	3	Lawlers ...	Nil	...	13
Broome ...	Nil	...	4	Mt. Leonora ...	10	1	31
La Grange Bay ...	Nil	...	1	Mt. Malcolm ...	12	2	29
Wallall ...	Nil	...	Nil	Mt. Morgans ...	16	2	33
Condon ...	Nil	...	Nil	Laverton ...	23	2	23
Bamboo Creek ...	2	1	2	Murrin Murrin ...	18	1	26
Marble Bar ...	3	1	5	Yundamindera ...	32	2	23
Warrawoona ...	Nil	...	Nil	Kookynie ...	16	2	30
Nullagine ...	Nil	...	Nil	Niagara ...	8	1	27
Port Hedland ...	Nil	...	3	Menzies ...	9	2	40
Whim Creek ...	Nil	...	2	Mulline ...	21	2	27
Roebourne ...	Nil	...	Nil				
Cossack ...	Nil	...	Nil	COOLGARDIE GOLD-			
Fortescue ...	Nil	...	Nil	FIELDS :			
Onslow ...	Nil	...	Nil	Davyhurst ...	8	2	71
Winning Pool ...	Nil	...	3	Goongarrie ...	34	3	49
WEST COASTAL :				Broad Arrow ...	24	2	68
Carnarvon ...	Nil	...	7	Kurnalpi ...	52	3	77
Sharks Bay ...	5	1	15	Kanowna ...	21	2	63
Wooramel ...	10	1	17	Bulong ...	40	3	72
Hamelin Pool ...	5	1	10	Kalgoorlie ...	44	4	80
Northampton ...	85	8	99	Coolgardie ...	44	4	65
Mullewa ...	62	6	41	Burbanks ...	19	2	68
Geraldton ...	47	7	64	Widgemooltha ...	16	3	116
Greenough ...	42	6	81	Norseman ...	37	4	104
Dongarra ...	66	7	78	Boorabbin ...	30	3	48
Minginew ...	94	5	77	Southern Cross ...	28	4	56
Carnamah ...	89	5	65				
Dandarragan ...	150	8	198	S.W. COASTAL :			
Moora ...	98	8	125	Kalamunda ...	231	9	...
Walebing ...	41	8	118	Gingin ...	418	7	207
New Norcia ...	158	8	139	Guildford ...	167	8	224
MURCHISON FIELDS :				Perth Gardens ...	188	13	206
Peak Hill ...	Nil	...	14	„ Observatory	219	13	231
Abbotts ...	6	1	22	Fremantle Signal	185	14	171
Gabanintha ...	3	1	10	Station			
Nannine ...	7	1	16	Fremantle Oval ...	157	10	...
Cue ...	14	2	15	Rottneest ...	223	9	157
Day Dawn ...	9	1	10	Rockingham ...	197	8	246
Lake Austin ...	20	1	19	Jarrahdale ...	251	10	353
Lennonville ...	27	3	15	Mandurah ...	162	12	251
Mt. Magnet ...	36	3	20	Pinjarrah ...	190	10	259
Yalgoo ...	20	3	40	Collie ...	371	14	248
Murgoo ...	4	1	8	Bunbury ...	223	13	246

RAINFALL—continued.

STATIONS.	Total for October, 1908, in points, 100 points=1 in.	No. of wet days.	Average for October.	STATIONS.	Total for October, 1908, in points, 100 points=1 in.	No. of wet days.	Average for October.
S.W. COASTAL—con- tinued.				S.W. INLAND—con- tinued.			
Donnybrook ...	224	15	231	Arthur ...	88	11	155
Busselton ...	238	13	219	Wagin ...	66	11	135
Cape Naturaliste ...	259	14	...	Katanning ...	67	13	184
Karridale ...	386	14	315	Broomehill ...	93	13	184
Cape Leeuwin ...	265	20	278	Kojonup ...	137	9	211
				Greenbushes ...	246	12	330
S.W. INLAND:				Bridgetown ...	295	13	310
Kellerberrin ...	34	5	66				
Meckering ...	58	5	90	SOUTH COASTAL:			
Newcastle ...	62	5	143	Mt. Barker ...	272	13	287
Northam ...	29	5	89	Albany ...	235	14	311
York ...	23	4	103	Breaksea ...	197	15	292
Beverley ...	47	4	85	Bremer Bay ...	119	10	229
Brookton ...	42	5	...	Hopetoun ...	57	6	252
Wandering ...	113	12	196	Ravensthorpe ...	72	5	229
Pingelly ...	45	7	93	Esperance ...	169	6	215
Narrogin ...	122	8	133	Israelite Bay ...	97	4	158
Marradong ...	127	10	211	Balladonia ...	43	4	112
Williams ...	91	10	141	Eyre ...	76	5	73

E. B. CURLEWIS,

Divisional Officer for W.A.

REMARKS ON RAINFALL FOR OCTOBER, 1908.

With the exception of the district stretching from Mullewa southwards to Carnamah, and eastward to Lake Austin and Mount Magnet, and also a few scattered places in the South-West and South, the rainfall has been below the average. The only two (2) stations showing a large excess are Gingin with 418 points and Collie with 371 points, being an increase above the average of 211 and 123 points respectively. The majority of places in the Tropics record "Nil."



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PERTH.
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1908.

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The sale of Mt. Lyell Manures in Western Australia has been enormous, and already our sales for the coming season have exceeded those of last year.

Watch carefully

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Dairy State Farm, Brunswick,
Tower Silos, 25ft. high, 16 and 18ft. diameter; Capacity, 75 and 100 tons.

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Department of Agriculture
OF
WESTERN AUSTRALIA.

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Part 6.

NOTES.

Profit in Cows.—A farmer at Hawera, New Zealand, last month drew a check from his factory for £187 for the milk from 100 cows.

Domestic Cold Storage.—Refrigerating and ice-making equipments for household purposes are being introduced. These machines are operated by a small electric motor and are capable of producing 10lbs. of ice daily, and also refrigerating all the provisions necessary for a family.

Demand for Dairy Stock in Canada.—Hoard's *Dairyman* says the demand for dairy products grows faster than the cow population, and that it is likely to continue. No matter to what part of the country a person may go, there seems to be a large demand for dairy stock. Farmers are alive to the importance of keeping good cows.

Antidote for Poisoned Stock.—Mr. R. L. S. Crawford, of "Milroy," Brookton, who obtained some of the antidote supplied by the Stock Department for treatment of stock affected by poison plants, has written to Mr. J. M. Hopkins to say that he administered the remedy to two of his cart horses, which had been poisoned and that they recovered thoroughly.

White-washing Machine.—The machine for white-washing, which has come into general use in America and Canada, is a decided success. It can be used in places where it is impossible to use a brush, and is much more rapid in its application. The whitewash will adhere to wood if it is properly compounded and strained so as to remove grit that might clog the nozzle.

Export of Fruit.—The local manager of the Orient Royal Mail Line of steamers has intimated to the Department that space can be secured for shipments of fruit during the forthcoming season in the following boats:—

Oroya, leaving March 1 ; Ortona, leaving March 15 ; Orontes, leaving March 29 ; Asturias, leaving April 12 ; Omrah, leaving April 26. Shippers should apply to the Branch Manager at Fremantle for particulars.

Average Milk Yield.—Statistics show that the average milk yield in New South Wales has increased during the last five years from 294 gallons per cow to 368. Whilst this is a satisfactory advance, it is far below the average in Denmark, which is over 700 gallons per cow. But the methods and care in the treatment of cows by the Danish dairyman would probably be found far too expensive for his Australian contemporary.

Cotton Cultivation in Queensland.—According to the Government Statistician of Queensland, the cultivation of cotton is steadily increasing in that State. The total area under cotton last year was 300 acres, which gave a crop of 109,294lbs. of unginned product, an average of 364lbs. per acre. This, however, does not indicate a very substantial return, being about half of what would be expected from the Sea Island variety.

The Deadly House Fly.—Dr. Jackson, of New York, has found as many as 100,000 faecal bacteria on the legs, body and mouth of one fly, and has shown in that city that there was an exact correspondence between the prevalence of flies and the mortality from diarrhoeal diseases. It is one of the chief sources of that infection which, in New York City, causes annually 650 deaths from typhoid fever, and about 7,000 deaths from other intestinal diseases.

Cotton in Korea.—The cultivation of cotton in Korea, which is much encouraged by the Japanese Association of Cotton Planters, appears likely to become an important industry. The Japanese build great hopes on the future of cotton cultivation from American seed in Korea, and anticipate that in a few years a large proportion of the cotton required for the rapidly extending cotton manufacturing industry in Japan will be obtained from Korea.

Dairying in Siberia.—Before 1893 Siberia produced no butter at all for exportation. In 1893 the first modern arranged dairy for producing butter for export was started at Bezirk, near Kurgan, and in 1898 there were 140 dairy farms in Siberia, exporting about 50,000cwt. butter. In 1902 the number of dairy farms reached 2,035, and the export of butter in that year reached the amount of 690,000cwt. In 1903 the butter exports were given at 2,487,000 pounds, equal to, say, 830,000cwt., and for 1907 they were roughly calculated at 1,084,000cwt.

Destruction of Ants with Cyanide.—Great success has attended experiments in the use of cyanide for destroying ants in the orchards of Southern California, by Mr. R. S. Woylum, of the United States Bureau of Entomology. He now recommends that a solution of an ounce of cyanide of potassium to a gallon of water be sprayed on the ground travelled by the insects, and also that a quart of the solution be poured into the ant-hills, which will invariably destroy the colonies. It is desirable to use a cyanide of uniform quality.

Busselton Show.—The National Show of the Southern Districts Agricultural and Pastoral Society will be held at Busselton on Wednesday and Thursday, January 20 and 21, 1909. The schedule of prizes is a very complete one, and includes the Governor's Cup, presented by His Excellency Sir Frederick Bedford, G.C.B., for the exhibitor gaining the highest number of points in Sections A, B, C, E, F, and G. General entries close on Tuesday, January 5th, and late entries with double fee on Saturday, January 9th, at 9 p.m. in each case.

Distribution of trees to Settlers.—The late Agricultural Conference passed a resolution to request the Government to resume the practice of distributing pines and ornamental trees free of charge to *bona fide* settlers. It will be of interest to settlers to know that trees will be supplied to them by forwarding applications for what they require to the Inspector General of Forests. Application should be made through the local Roads Boards, Farmers' or Progress Associations.

Gypsum Analysis.—A sample of gypsum from Carnamah, forwarded by Mr. C. J. Horrocks, of Claremont, was submitted to the Government Analyst, who reports the following result :—Hydrated Sulphate of Lime (Gypsum), 81.09 per cent. If the deposits are easy of access, they should be of value to the district. Gypsum of similar quality is delivered on truck on the Goldfields line at from 9s. to 10s. per ton loose, and is carried on the railways at the rate of one farthing per ton per mile.

Errata.—In the first part of Dr. J. B. Cleland's report on "Trypanosomiasis and other Diseases in Camels," in the November *Journal*, the following corrections are made:—Page 829, read "First blood examination," etc.; "Second," etc.; "Third," etc. Pages 831 and 832, in paragraph on "Inoculated Disease," read "5 c.c."; in last paragraph, page 831, "Other signs had little time to manifest themselves, and were masked," etc. Page 833, paragraph "*Camel 11c*," read "numerous thick"; page 834, paragraph "*Camel No. 11*," read "aseptic precautions"; page 835, "September 11th," read "general conditions good"; page 836, "*Camel 105*," read "Dog No. 4, 1 or 2 c.c." etc; page 838, "*Camel 152*," read "injected into Dog 7," etc.

"Times of Ceylon" Christmas Number.—We are in receipt, through the courtesy of Mr. F. J. Wayman, Director of the Ceylon Bureau in St. George's Terrace, of several copies of the Christmas edition of the *Times of Ceylon*. It contains 70 pages of excellent descriptive reading matter printed on enamel paper, profusely illustrated, and is altogether a most interesting and creditable publication. The subjects of illustration are various, and bear picturesquely on the official, military, social, and industrial life of the island, as well as giving many specimens of the beautiful natural scenery of the country. Both native and British habits and institutions are admirably portrayed, generally on up-to-date lines. The letter-press comprises attractive reading, including short stories, accounts of out-door life and work, sports, and pastimes, etc., giving one the impression that there are far worse places than Ceylon to be found, either for active enterprise or *dolce far niente* pleasures. Several West Australian views are also given, with an article by the local representative of the *Times* on the Falmouth of Australia, meaning Albany.

Clipping Horses.—A French writer has lately entered a protest against the clipping of horses and he makes out a fair case from his own point of view. He contends that the result of clipping horses at the commencement of winter, or indeed at any time, seriously interferes with the natural functions of the skin. When the work was done with scissors, the injury was not so great, as a certain quantity of hair was left which formed a protection to the animal against any sudden change of weather. The modern system, he says, cuts so close to the skin that the bulk of the hair is injured, and the character of the hair is altered, as is shown in the dulness of the succeeding coat. The writer referred to says that where horses are properly treated in the way of grooming and regularly stabled, there is no necessity for clipping, and as an example, he gives the practice of the General Omnibus Company of Paris, which for the last nineteen years have not clipped their horses.

Vegetables as Medicines.—The farmers' vegetable garden is the medicine cabinet of the world, and by a thorough and well-balanced diet of these, there is no reason for one's health becoming impaired. Carrots are excellent for gout. Cranberries correct the liver. Asparagus stimulates the kidneys. Watercress is an excellent blood purifier. Honey is a good substitute for cod liver oil. Parsnips possess the same virtues as sarsaparilla. Celery contains sulphur and helps to ward off rheumatism, and it is at the same time a nerve tonic. Bananas are beneficial to sufferers from chest complaints. Onions are good for the nerves. Beet-root is fattening and good for people who want to put on flesh. Tomatoes are good for a torpid liver, but should be avoided by gouty people. Lettuce has a soothing effect on the nerves and is excellent for sufferers from insomnia. Spinach has great aperient qualities and is far better than medicine for sufferers from constipation. The juice of a lemon is excellent for sore throat, but should not be swallowed, but used as a gargle.

Low Conditioned Stock.—On previous occasions we have noticed reports of cattle in several districts falling off in condition through local causes, becoming emaciated and afflicted with diarrhoea. Recently the Chief Inspector of Stock (Mr. R. E. Weir) visited the Midlands and inspected a number of cattle in the condition named, some of which had died. He found several in a very emaciated state and suffering from diarrhoea. One was destroyed and examined, when it was found that the trouble was due to infestation of the omasum, one of the compartments of the stomach. The cause was due to the animal having been too long on the same class of country and the feed being more or less of an indigestible character. To prevent this disorder, it is necessary to have frequent changes of pasture. The following treatment was advised and observed :—

Linseed Oil, 1 pint.

Treacle, $\frac{1}{2}$ lb.

Common Salt, $\frac{1}{2}$ lb.

Ginger, 1oz.

Followed with a daily supply of 4oz. each treacle and salt in the food supply, which should be of an easily digestible character.

DEPARTMENT OF AGRICULTURE.

ANNUAL REPORT, 1907-8.

1st December, 1908.

To the Hon. the Minister for Agriculture,—

I have the honour to herewith submit a report on the work done by the Department during the past year, and have also attached reports of heads of branches.

I have, etc.,

A. DESPEISSIS,

Under Secretary.

ANNUAL REPORT.

Appropriation.

In submitting a statement of the vote to the Department of Agriculture I have made the information retrospective.

			1905-6	1906-7	1907-8
			£	£	£
Expenditure	..	..	49,310	42,646	46,077
Revenue	..	..	9,813	10,727	13,542
Net Cost	..	..	39,497	31,919	32,535

The Department has since 1906 assumed the control of two new farms, viz., Nangeenan and Brunswick, the Central Markets, the Rabbit-proof Fence, the stock buying of the Government, and initiated a policy of buying and distributing farm stock to settlers. Whilst this work has been going on outside, the clerical work in sympathy with the general growth of the Department has shown a steady increase.

It is therefore a fact worthy of note, that whilst the work of the Department is practically trebled, the net cost to the country for its administration is less than it was three years ago.

The year that has passed has been the most remarkable recorded in connection with land settlement and agricultural expansion in Western Australia.

The progress of agricultural development is keeping pace with that of land settlement. During the twelve months ending 30th June, 1908, the records of the Lands Department show that 4,100 settlers applied for 1,190,554 acres of Crown land.

Similarly the area under crop, which in the preceding year was 460,825 acres, increased last year to 494,987 acres.

The area under crop has about doubled in the last five years. The history of each branch of agriculture has been one of progress.

Wheat for grain advanced by 29,316 acres, oats by 18,304 acres, barley, 2,429 acres, orchards, 2,291 acres.

The past year was notable for the establishment of an export trade in wheat and flour, valued at £100,000, and this factor for all succeeding time will assure our own farmers the London price for their product, less, of course, the cost of railage, freight, handling, and other incidentals. It is a sum of money supplementing the beneficial operations of the Agricultural Bank, which, when placed in circulation amongst the farming community, was largely responsible for the increased area brought under cultivation by producers and was also a stimulus to further expansion.

Wheat.

The quantity of wheat used for seed throughout the State ranges from 4/5th to 1½ bushels per acre, with an average for the whole State of 1 1/10th bushels. The advocating of thin sowing of a few years ago has, in many instances, proved disappointing to those who have practised it. The result, more especially in wet seasons, is evident in weedy crops, and a correspondingly light yield.

In spite of this disadvantage the average yield of the wheat crop of Western Australia compares well with that of the five Australian States. Thus—

Queensland averages	..	..	..	14.10 bushels.
Western Australia	..	..	..	11.2 ..
New South Wales	..	..	..	9.72 ..
Victoria	..	..	..	7.91 ..
South Australia	..	..	..	5.37 ..

The limit line of wheat cultivation which a few years ago did not extend more than a few miles beyond Northam, York, and Beverley, has now been carried with safety some 50 miles further East.

With a more thorough system of well-cultivated fallow land, with early sowing of earlier kinds, it is now demonstrated that the safe cultivation of wheat, either for grain or for hay can be carried out with profit within the nine inch rainfall belt.

As most of the water falls in the South-West Division between March and October, which are the months during which our main cereal crops grow, this rainfall does its full duty.

Thus crops cut for hay have been reported this year at such places as Mullewa, 50 miles east of Geraldton, and Southern Cross, 175 miles east of Northam. Even the Eastern Goldfields, which I visited in July last, showed this season in the vicinity of Coolgardie, Kalgoorlie, and Kanowna, promising wheat crops.

Consumption and Export of Wheat.

The quantity of wheat consumed in this State is estimated for the year at 2,152,000 bushels, on the basis of a per capita demand of eight bushels on a population of 268,000. This rate of consumption is two bushels in excess of the estimated average consumption in Australia. The larger number of adults in our population accounts for this.

The quantity of seed required last sowing was 412,835 bushels, or at the rate of 1.1 bushel on the 375,305 acres sown with wheat for grain and hay. The annual requirements of wheat for seed and for food have therefore

reached 2,564,835 bushels, which is 367,251 bushels less than the estimated quantity of wheat produced in Western Australia last season, that amount being given as 2,932,086 bushels.

For the first time in the history of this State has a surplus of wheat been available for export, and Western Australia may well, from now on, be reckoned as a wheat exporting country and promises to take rank with the leading wheat producing States of the Commonwealth.

Wheat Experimentalist.

First and foremost amongst our cultivated crops is wheat.

A closer understanding of the requirements of this crop has done much to extend the area under which the growing of that cereal has been proved to be profitable. Vast areas of country which a few years ago were regarded as barren wastes have since proved to be first-class wheat land. This result is due to the more extensive practice of fallowing. Fallow land has more than quadrupled in ten years. It is estimated that we have now close on 200,000 acres of land in fallow, which will be sown concurrently with the breaking of the rainy season next autumn. The more general use of fertilisers has also advanced wheat growing, while the introduction of modern farm machinery, including the multiple furrow stump-jump plough and the harvester, has completed the revolution which set in a few years ago in our modern methods of wheat growing.

A great deal of ignorance, however, still prevails regarding the best kinds of wheat to sow. These necessarily differ according to districts, soils, and climate. Differences of four to five bushels to the acre are common in the yields of different wheats grown on the same farm. In this respect some of the old types have been completely superseded by new kinds in which conditions more in accord with the peculiarities of the climate have been fixed by scientific breeding.

It is a fact worth noting that our most profitable wheats, either for grain or for hay, are Australian types, and notable amongst these are some West Australian varieties, such as Alpha, Australian Cross-breds No. 73 and No. 100, which are at the top of the list amongst our most profitable wheats. The credit of having brought them out belongs to Mr. Berthoud, the manager of the Experimental Station at Hamel.

The creation of a single variety which would increase our average yield one bushel only would benefit the State to the extent of £50,000 annually, on the basis of our present wheat production.

The advisability of enrolling the services of an enthusiastic wheat experimentalist is one which is worthy of early consideration. Such work should go hand in hand with laboratory research, without which it is necessarily incomplete. During the year the Government Analyst has been able to instal a testing mill, which has permitted him to make a start on the important work of investigating the milling qualities of grain grown in the State. With the assistance of a trained field experimentalist the behaviour of different varieties under varying conditions of season, soil, situation, cultivation, and manuring would result in such information being collected and made available as would benefit growers throughout the State.

Local Manufacture of Agricultural Machinery.

The unprecedented development of our rural lands, notably in the wheat growing areas, necessitates a considerable expenditure of money in providing the machinery necessary for the putting in and to the reaping of the crops.

For the purpose of estimating what that expenditure means we may conveniently subdivide the area of land under cultivation, and also the area of land suitable for cultivation into units of 1,000 acres each. A fair basis of the estimation of the machinery required would be that of a wheat farm of which one-third would be under crop, one-third fallow land, and one-third grazing land.

Irrespective of drays, wagons, harness, which are manufactured locally, the following machinery will be required :—

	£
Two 3 F.S.J. ploughs at £27	54
One 10-disc S.J. cultivator	25
One 3 sections S.J. harrows	8
One seed drill	34
One harvester	75
One reaper and binder	40
One chaff cutter	14
	<hr/>
	£250
	<hr/>

To this list will, in some instances, be added accessories such as :—Motive power, hay press, wool press, a proportion of the cost of which will have to be borne by the 1,000 acre unit section of land under consideration.

It is thus seen that, irrespective of minor tools, carts, mechanical power, etc., the farm machinery required for the working of a 1,000 acre section of agricultural land such as described above, is about 5s. per acre, or rather more when railway freight is added.

The wear and tear on such machinery will be pretty heavy, and repairs, new parts, and new machinery will be required now and again.

It thus appears that in order to cultivate and work the 13,300,000 acres of land alienated, or in process of alienation from the Crown, a sum of £3,325,000 must be spent on machinery, the bulk of which has hitherto been imported, but is nevertheless capable of being manufactured in this State.

The consideration of how best to encourage the local manufacture of agricultural and other machinery is one which has naturally received, and will continue to receive attention.

Reclaiming Sand Plains.

The reclamation of our sand plains and their better utilisation for carrying stock and crops is a matter of much importance to this State where extensive sand plains occur between the areas of the more fertile timbered land. These sand plains at present offer fair picking for stock, more especially after a burn during the summer months.

There are, of course, grades as regard their quality. Some are not sand plains at all, but are open stretches of cement-like land which, when broken up and fertilised, yield payable crops. Others consist of a white hungry sand,

varying in depth and over-lying a hard "cement" pan consisting chiefly of a coarse ironstone gravel.

These sand plains, it is ascertained by analysis, are very deficient in all plant foods, but especially in nitrogen and phosphoric acid.

The Government Analyst has, during the year, formulated a series of experiments, which have been carried out at the three State Farms of Chapman, Nangeenan, and Narrogin, to so modify the chemical and the mechanical nature of our sand plains so as to enable them to be cultivated with profit.

The lack of humus and low capacity for moisture of these lands rendered it necessary to effect radical alterations in their physical character.

For that purpose two kinds of hardy leguminous crops, viz., field peas and lupins were used and their growth stimulated by dressings of potash and phosphates.

The potash fertilisers were generously donated by the manager for Australia of the Potash Syndicate. The phosphates used were basic slag, or Thomas' phosphate, on account of the lime that fertiliser contains. The land besides received a substantial dressing of gypsum from the deposits at Hine's Hill.

The Potash Syndicate also liberally supplied seeds of yellow lupins, which do well on soil poor in lime, and also blue and white lupins, which thrive in soils richer in that constituent. Besides these, grey winter peas, sand vetches, and midsummer rye were also forwarded. The seeds were inoculated with nitrogen cultures and sown in rectangular plots five acres in area divided into sections, each submitted to a particular treatment.

The resulting green crop has been ploughed in while still green and succulent and the land fallowed. It is intended next autumn to prepare it in the usual way and have wheat sown with superphosphate at the rate of 70lbs. of fertiliser per acre. The wheat of each plot will be carefully harvested and the yields recorded.

It is intended to carry out the experiment through three rotations over a period of six years.

Although no practical results which will carry conviction to the mind of the settler can be drawn for a long time yet, the reclamation of large stretches of our sand plains could well proceed, with the aid of the ever spreading lupins; a plant which has demonstrated its adaptability and its liking for our sandy soils. It improves the ground to a marked degree, and in the summer, when the seeds have been scattered, they are eagerly picked up by sheep and prove particularly fattening. Seeds from large expanses of our sandy country now under lupins could be gathered at a small cost and distributed to those who have sand plains on their holdings.

Stock Manure from Ships.

The stringent stock regulations now in force do not permit of the landing of manure from steamers carrying stock.

That refuse is valuable manure which, if it could be used ashore, would greatly increase the productivity of the soil. At present it is lightered to Hall's Bank, outside the harbour, and there cast overboard.

The question of how best to prevent the wasting of what might be valuable manure if properly utilised has received attention.

It is known that all stock which are allowed to land are accompanied by a certificate that they are healthy and free from disease.

The Chief Inspector of Stock, who has given consideration to the question, expresses the opinion that provided precautionary measures are adopted, not only the manure from steamers from the Eastern States, but also that from tick-infested centres might be allowed to be landed.

From a return he has compiled, attention is drawn to the fact that between 4,000 and 5,000 tons of stock manure are destroyed annually, although after suitable treatment it could be used in the vicinity of Perth and Fremantle by market gardeners, without the slightest danger of the spread of infectious and contagious diseases.

Two-thirds of that manure come from vessels trading between the Eastern States and other comparatively clean ports and Fremantle; one-third from the steamers trading between the tick-infested port of Wyndham and also steamers from North-West ports and Singapore and Fremantle.

A simple and efficacious method of dealing with this refuse at a cost which would approximate 5s. per ton has been considered, and consists in conveying the manure to and dumping it into large pits, filling at the top and removing at the base after fermentation for a few months.

As the question, however, of erecting at Fremantle central abattoirs which would treat this manure in conjunction with that brought by the stock is one which has been suggested, no immediate steps therefore have been taken in order to utilise this wasted manure, worth in the aggregate some £1,200 annually.

Agricultural Conference.

During the year a conference of delegates from Agricultural Societies has met at the offices of this Department to discuss matters of interest to agricultural industries.

At that conference 60 delegates, representing agricultural interests distributed over the farming districts of the State, assembled and discussed and passed a number of resolutions which have either been given effect to or are receiving consideration.

The proceedings of this conference of leading settlers of recognised experience have been published in pamphlet form and distributed.

Agricultural Subsidies to Societies.

The multiplication of Agricultural Societies may be regarded as an index of the interest which settlers on the land take in matters which touch on the production of the soil.

The vote to Agricultural Societies which is paid as a subsidy in aid of the funds raised for prizes at shows is necessarily a growing quantity, and increases with the number of the societies and the importance of the schedules of prizes.

During the year a conference of societies has taken place with the view of affiliating with the Royal Agricultural Society and adopting such rules as will ensure greater uniformity.

There is a general sentiment expressed that the multiplicity of shows re-acts unfavourably on the general interest taken outside the districts im-

mediately concerned, and is, moreover, such a tax on exhibitors that the number of exhibits suffer in consequence.

The annual show is, unfortunately, in a number of cases the alpha and the omega of the efforts put forth in fostering agriculture. Much good could, however, be done in giving special prizes for the best crops, pastures, and orchards. Several agricultural Societies interest themselves in the direction indicated, and much benefit is shown as a result.

Prizes could also be given for experimental plots for the trial of crops and manures conducted under conditions which would permit the deduction of conclusions which would be of importance in the district itself as well as in others similarly situated.

The yearly display of agricultural produce grown on State Farms or stored in our cool stores has been conducted with much success. These displays proclaim the variety of produce which can be raised in the State, and afford a valuable means of conveying information and exciting interest.

The Pavilion on the Royal Agricultural Show Ground, which, when built a few years ago, was regarded as being large enough for many years to come, is now barely large enough to hold the exhibits from our State farms and works.

Noxious Weeds.

Of the several noxious weeds proclaimed under the Act, two, viz., the prickly pear in the neighbourhood of Roebourne and Cossack, and the stinkwort, in those districts where it has not yet established itself firmly, have received attention.

The difficulty at Roebourne of procuring on the spot sufficient firewood to burn the prickly pear has been overcome by digging trenches and burying the leaves when they were chopped down.

A fresh addition was made during the year to the list of proclaimed noxious weeds and a campaign will be opened this summer against the water lily. The plant is found in a few ponds and water-holes around Perth.

Its reputation in Queensland, where it has taken possession of water-courses, is such that no effort should be spared in eradicating it wherever it is found to grow.

Development of Dairying.

In addition to the creation at Brunswick of a State Dairy Farm, which is described at some length in this report, direct encouragement has been given to dairying in several directions.

The constant drain of money from this State to provide the local requirements in dairy produce (butter, cheese, preserved and concentrated milk) averages for the last ten years £365,800, or in round numbers £1,000 a day.

This amount is much less now than it was ten years ago, although the fact that the population is a little over 100,000 greater now than it was then shows that we are gradually, if slowly, providing for local requirements.

To better stimulate dairying, Mr. Kinsella, the dairy expert, has visited the districts most likely to give attention to this branch of agriculture in the immediate future, and by means of personal interviews, addresses, leaflets, and concisely written pamphlets has done much to distribute information and direct the beginner on the right road to successful dairying.

A working dairy installed on the show ground of the Royal Agricultural Society has, under the direction of the Dairy Expert, proved a source of great interest on the part of the visitors.

Hasty criticism has been levelled at the Department in regard to its policy of introducing dairy cows for sale to settlers on easy terms extending over two years.

It is a matter for regret that out of the 520 cows introduced under the system referred to, some have proved unsuitable on account of injuries received on board ship and also on account of ailments to which all stock are subject. A good many untrue statements have been pointedly circulated concerning these cows. Several which were described by their disappointed owners as useless and most disappointing have fallen back into the hands of the Department. Under the same care the other cows enjoy, which are milked at the State Dairy Farm, these animals have almost at once recovered condition and become profitable cows.

The Department is in possession of reports showing that a number of these imported cows exhibited at shows have been awarded prizes in competition with local cows also entered. A number of letters are also in our records testifying to the assistance these cows have been to settlers who for years past had through sheer necessity to use imported timed milk.

During the spring and early summer months the supply of milk has this year been fully up to requirements, and owners of dairies with quantities of milk left on their hands had to extract the cream for which there is always a demand.

The number of butter factories in the State has, during the year, been increased by one which had been opened a few months ago at Bunbury under favourable auspices.

Every legitimate assistance the State can give to these factories has been given, and it is hoped that an application for the permission to grant a bonus on butter will be favourably considered by the Federal Government.

Brunswick State Farm.

As part of the general scheme for developing the dairying industry in this State and of checking the enormous amount of money which goes out of the country to purchase butter and dairy produce, the Government decided to create a State Farm where dairying could be conducted in a manner that could be copied by the dairy farmer and carried out on practical lines : also :

- (1.) For supplying stud stock of the best strains procurable at reasonable prices to dairy farmers.
- (2.) To demonstrate that with the assistance of irrigation a small acreage of land can be made to carry a large number of stock.
- (3.) Where a variety of fodder crops can be introduced and experimented with so as to ascertain their value for feeding off, both in a green state for curing into hay or for preserving into big silos in a succulent form.

In order to carry out this scheme, a portion of the repurchased Perren Estate at Brunswick Junction, consisting of about 800 acres, was vested in this Department.

The Hon. Minister for Agriculture, Mr. Jas. Mitchell, M.L.A., has taken more than his usual interest in the development of this farm, and decided to effect in the first twelve months of its creation all the improvements considered necessary.



Young Ayrshire Bull Terrier at Stone Dairy Farm, Bournemouth.

Capacious cow and calf stables, sheds, and piggeries were designed and constructed as an example to be followed in starting an up-to-date dairy farm.

Every consideration was given to the conveniences for handling stock, hygienic surroundings, etc., while the cost was kept down as much as possible.

The herd of dairy cows (of some of the best Ayrshire strains in Australia) which was collected last year is now thoroughly acclimatised.

The nucleus of what is intended to become a much larger herd of Berkshire pigs has been bought from the most successful breeders and importers.

The first annual sale of the progeny of the farm stock which has recently been held has been in every way successful. A number of buyers from distant farming districts as well as from the neighbourhood have been able to secure, at a moderate price, well-grown stock of good breeding, which will tend to improve their own stock. Three capacious tower silos, capable of holding 250 tons of fodder have been erected. These it is intended to keep filled with winter-grown crops as well as with maize and other suitable summer crops grown under irrigation. An efficient silage cutter and blower of a capacity of 4 to 5 tons per hour deals with the green stuff as fast as it can be brought up from the fields.

An irrigation scheme, now in operation, is the most comprehensive in the State. The plant is capable of dealing in the summer months with 80 acres of land; at present, however, we only have 50 acres graded and ready for watering. Some of the land thus treated is on rich, deep alluvial of the river bank, while a portion is on the higher clay plateau, and consists of land typical of many thousands of acres in the same locality.

The cost of this scheme to date amounts to £992, of which £524 for a 12-horse oil engine, 6 inches centrifugal pump, piping and fittings, is capable of elevating 500 gallons of water per minute from the river to the height of 28 feet, if necessary. The balance, £469, is for labour, supervision, freight, etc.

The class of Red Gum and Flooded Gum land operated on costs about £8 and acre to grub and clear. The total amount spent on the irrigated land, including cost of purchase, fencing, etc., is under £30 per acre, and when the scheme is completed the expenditure will be brought down to £22 per acre, whilst the capital value with water laid can safely be reckoned at £40 per acre. On such land two heavy crops a year can be depended on, as under irrigation seasons are capable of being modified as the farmer wishes.

The land referred to has, while the grading was proceeding, carried two luxuriant winter crops, and 5 acres have last summer also carried a crop under irrigation at a low estimate; these 50 acres have already during the period given a return which may, at a low estimate, be reckoned at £400 in the field.

The scheme which has been designed and carried out by Mr. A. H. Scott, does him great credit. Its successful working has, to a great extent, enhanced the value of property in the neighbourhood, and has been the means of opening a new area of productiveness for much land similarly situated.

The following fodder crops which have so far been tried have yielded returns much above the average, and ensure for the stock a variety of feed in unstinted quantity:—Oats, rye, maize, sorghum, pearl millet, vetches, field peas, cow peas, lucerne mustard, Jersey kale, field cabbages, turnips, swedes, mangel wurzel, silver-beet, buckwheat, potatoes, linseed, pig melon, paspalum, Italian canary grass.

The results of bringing water on the land have been so encouraging that the propriety of turning to better account the balance of the area of 800 acres vested in the Department has received the attention of the Minister, and steps are now being taken to gradually subdivide that area into small farms of about 50 acres each, which will be partly irrigated and let with the water right to tenant farmers, together with a small herd of milk cows, some breeding sows, and the necessary farm buildings and equipment.

Special Agricultural Settlement, Tammin.

The particularly liberal terms under which the State assists genuine settlement on the land make it possible for a settler to overcome the initial difficulties attendant on the first years of farming, and enable him to gradually reap the reward of his labour.

Easy terms of land purchase, generous advances from the Agricultural Bank, a reliable climate, fertile land, and a ready market to absorb farm produce are factors which favour the new settler.

A demonstration in a practical way of what can be done under advantages such as these has, during the year, been inaugurated under conditions which are capable of being repeated in a number of localities similar to the one selected.

An area of forest and plain country North of Tammin, situated 15 to 25 miles from the railway line, and within a safe 11-inch rainfall belt, has been set apart for the experiment.

Fifty blocks of land ranging from 640 to 1,000 acres have been surveyed and allotted to 50 selectors. An advance not exceeding £50 is made to cover the cost of settling the men on their blocks. They are then able to provide themselves with the necessary iron, tools, water tank, rations, etc., to enable them to start improving their land and avail themselves of the conditions under which the Agricultural Bank advances are made. All the work is done by the holder of the land, in most cases assisted by his own family. The work is inspected every month, its value estimated, and the amount paid to the settler less a small amount to pay off his debt.

The whole amount is debited against the block of land. In this way the holder will be able when the season comes, to sow a crop the proceeds of which will enable him to effect further developments, until after a few years he will be in a position to redeem his debt and gradually transform into an improved freehold property, a stretch of virgin land hitherto absolutely unproductive.

Stock Department Buildings.

New stables have been erected on land used for that purpose by the Survey Department for holding Government horses passing through Perth on the way to the seat of fresh works, and also for collecting horses requiring special treatment or intended for sale.

During the year arrangements have also been in progress to move the Stock Office at Fremantle to a more suitable site, and to better suited premises, and an understanding with the Fremantle Harbour Trust has now been arrived at to effect this object.

The Agricultural Bank has during the year been transferred to a suite of offices at the corner of St. George's Terrace and Howard Street, and more room has thus been made available for accommodating some of the officers of

this Department, an arrangement which facilities the access of the public to those officers they have dealings with.

Increase of Live Stock in the State.

The increase shown in quinquennial periods has been remarkable in the case of every farm stock.

Year.	Horses.	Cattle.	Sheep.	Pigs.	Goats.	Mules and Donkeys.	Camels.
1898	63,604	269,947	2,251,548	39,433	5,215	309	3,197
1903	82,747	497,617	2,600,633	50,209	14,120	505	2,314
1907	113,330	754,077	3,684,974	53,399	26,833	1,462	3,212

It is seen that horses have nearly doubled in ten years. The inspection of stallions and the issue of certificates to sound animals has long been accepted as one of the most important means of raising the standard of horses. The practice has already been adopted with benefit in Victoria. Within this State, the Northam Agricultural Society and also the Royal Agricultural Society have pronounced themselves in favour of inspection. With the view of ascertaining the number of entire horses over two years old in the State, the Department has requested the Government Statistician to collect the information, which is now made available for the first time. The number of entire horses over two years old in the State is shown at 3,617, of which 2,889 are in the South-West portion.

It is remarkable that the returns of cattle, which have more than doubled, show that Western Australia is practically the only State in Australia in which a large increase in the number of cattle has occurred during the last ten years.

Sheep have during that period increased by 33 per cent.; the South-West portion counting over one-third of the total number. The breeding of goats is making marked progress in the more arid portions of the State. Pigs are moving slowly, owing to the fact that wheat has hitherto been high in price and that the dairy industry is still in its infancy.

The number of mules and donkeys has increased 700 per cent. in ten years, and indications point to a rapid expansion setting in shortly in the breeding of that class of live stock.

Some of the finest jack donkeys that Australia has yet seen have of recent years been introduced by North-West breeders, and, from information received, more are on order.

The Catalonian breed is the breed favoured on account of its larger size, its activity, and its remarkable endurance.

Surra in Camels.

The prominence which has been given eighteen months ago to the discovery that a few camels out of a consignment of 500 introduced from Kurrahee were found to harbour in the blood a particular micro-organism lately discovered to be associated with surra has now died out.

The animals found affected have, after a lengthy process of examination, been destroyed although most of them had, it is reported, shown every appearance of being in good health.

The Government Pathologist, Dr. Cleland, and the Chief Inspector of Stock, Mr. Weir, have personally supervised this investigation, and it is pleasing to be able to record that if danger of an outbreak once existed, these officers have now for a period of twelve months been able to report that all danger has been removed.

The camels have since continued to remain in good health, and after their release from quarantine a number of them have been put to work.

The embargo placed on the importation of West Australian stock in the Eastern States has been modified, and stabled horses from a latitude South of the 24th parallel can now be shipped to other parts of Australia provided they are accompanied by a satisfactory certificate from the Chief Inspector of Stock.

There is no reason to believe that this embargo will be long continued.

State-bred Stud Stock.

The value of stud stock introduced from abroad continues to be very considerable.

Indications, on the other hand, become every year more evident that the enterprise of our breeders is beginning to bear fruit.

At our Agricultural Shows we find West Australian horses take pride of place with high class imported animals.

Competent judges assert that some of the locally-bred cattle would win favour in any part of Australia.

In sheep particularly it is evident that local industry has made considerable strides. High class wool has attracted the attention of Eastern breeders to the possibilities of this State. Several stud flocks, consisting of drafts of the most notable blood in Australia, has been established in the South-West Division of this State. The progeny of these sheep has more than held its own for quality of wool, and a number of North-West squatters who were in the habit of buying yearly scores of rams from Eastern breeders now breed for their Northern runs animals which adapt themselves more readily to local conditions, and are found in every respect as desirable as the best imported rams.

Poultry.

The suitability of the State for poultry raising is well demonstrated, and yet the increase has been very gradual, having only doubled in ten years.

The total number of poultry, including fowls, ducks, geese, turkeys, is now 593,214, which works out at a proportion of say 2 birds per head of the population. It is yet early to say we can handle a regular export trade, although our requirements are, to a great extent, supplied from local sources, the number of poultry imported amounting to only 35,000 head.

The Subiaco Egg Laying Competition has continued, and has proved almost self-supporting. The policy was adopted of making it compulsory to leave the male bird in the pen, and, as a result, a great number of sittings of eggs of the best strains have been sold.

Of eggs we still import £62,433 worth. This also is a decreasing quantity, the value in 1904 being £80,055.

Victoria and New South Wales have proved the benefit to be derived from exporting to London, by realising a net profit of 4d. per dozen over the local prices.

We come to the exporting stage, and can easily comply with the requirements of the London market at the time of scarcity as there is then a period of plenty here, as is shown on the following table :—

Wholesale price of Eggs per dozen in various Markets.

	Perth.			Sydney.			Melbourne.			London.			Canadian.															
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.												
January	1	0	2	0	0	7	to	0	11	0	8	to	0	10	1	2 $\frac{1}{2}$	to	1	7	1	2	to	1	7	1	0	1	6
February	1	1	"	2	5	6	7	"	1	4	0	10	"	1	1	0	11	"	1	8	1	0	"	1	3	"	1	3
March	1	3	"	3	1	1	0	"	1	6	1	0	"	1	6	0	11	"	1	2	0	10	"	1	0	"	1	0
April	1	9	"	3	0	1	1	"	1	4	1	2	"	1	6	0	10	"	1	0	0	8	"	1	0	"	1	0
May	1	6	"	3	0	1	0	"	1	9	1	1	"	1	4	1	0	"	1	1	0	9	"	1	0	"	1	0
June	1	4	"	2	7	0	11	"	1	9	1	3	"	1	8	0	10	"	1	0	0	8	"	0	10	"	0	10
July	1	4	"	2	6	0	11	"	1	4	1	0	"	1	6	0	10	"	0	11	0	8	"	0	10	"	0	10
August	1	1	"	1	5	0	7	"	0	10	0	11	"	1	3	0	10	"	0	10	0	8	"	0	10	"	0	10
September	0	9	"	1	1	0	6	"	0	9	0	9	"	1	0	1	1	"	1	2	1	2	"	1	5	"	1	0
October	0	11	"	1	3	0	6	"	0	7	0	7	"	0	10	1	1	"	1	6	1	3	"	1	6	"	1	2
November	0	11	"	1	6	0	6	"	0	9	0	7	"	0	11	1	3	"	1	8	1	3	"	1	6	"	1	1
December	0	11	"	1	6	0	15	"	0	11	0	9	"	0	11	1	4	"	1	8	1	5	"	1	8	"	1	1

Phosphatic and Gypsum Deposits.

The more general use of fertilisers which has been so marked within recent years, has permitted to reap profitable crops from land which a few years ago was regarded with much disfavour.

It is now acknowledged on all hands that no better investment can be made by the farmer than in fertilisers.

The following returns which show the quantity of fertilisers imported in this State during the past three and a-half years are worthy of note :—

						Tons.
1905	..	..	..	..	..	10,597
1906	..	..	..	..	..	13,597
1907	..	..	..	..	..	17,710
1908 (1st January to 30th June)	..	..	..	..	..	16,486½

Of these fertilisers, superphosphates were imported in the following quantities :—

					tons.	cwt.
1905	..	..	..	..	8,479	10
1906	..	..	..	..	8,629	5
1907	..	..	..	..	9,479	17
1908 (1st January to 30th June)	..	..	..	..	12,617	16

These quantities do not include the amount of guano brought from the Abrolhos Islands or the bonedust manufactured.

At the average rate of 1cwt. per acre we require for the fertilisation of our 500,000 acres of land under crop 25,000 tons of fertilisers, and it may safely be predicted that within a very few years these requirements will, at least, be doubled.

This estimate is certainly a conservative one when it is remembered that the extent of land either under crop, under sown grasses, in fallow, or in process of preparation for next season's crop, together with the previously cropped land used for grazing and the area ringbarked or partially cleared totals three and a-half million acres.

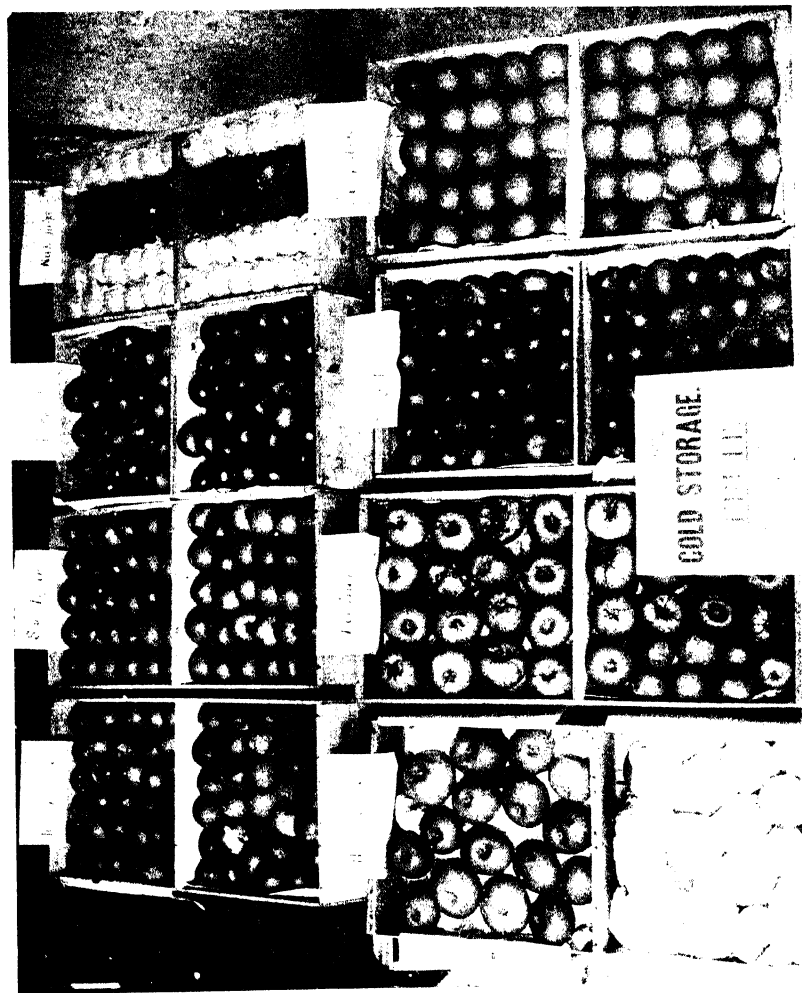
Provided a fertiliser can be obtained at a moderate price, it may fairly be estimated that at least 1cwt. per acre every third year would be a profitable application on such an area. On this basis the indication is that we should require 55,000 tons per annum if satisfactory progress is to be made in our agricultural industry. An outlay of about £225,000 per annum would thus be involved if present rates are taken as a basis of calculation.

In order to ascertain whether our requirements in fertilisers could be supplied from local sources the Department has encouraged a search in a systematic manner for phosphatic deposits within the boundaries of the State.

The Minister has by means of a small loan assisted a prospecting syndicate to explore some of the islands of the Recherche Archipelago lying in the vicinity of Esperance. A specially-engaged geologist has also been commissioned to explore the coast line north of the Moore River.

Both undertakings have been crowned with most gratifying success.

The efforts of the West Australian Phosphate Co. have resulted in proving that on some of the islands referred to, in the vicinity of Esperance, large deposits of phosphatic rocks occur, which, on analysis, are shown to contain 15 to 60 per cent. of phosphate of lime.



Cold Storage Fruit—Apples

Following upon the discovery Mr. S. Goezel, the geologist employed by the Department, has located in another portion of the State, on the coast line, north of the Moore River, the presence of cave phosphates in powdery form and more or less soluble.

The phosphate occurs in the shape of cave guano, which on analysis shows from 20 to 50 per cent. of phosphate of lime. Mr. Goezel's preliminary exploration has been followed by developmental work around Namban Creek, where a number of caves have occurred, the majority of which contain large quantities of the fertiliser. Information now in the possession of the Department shows that for a stretch of 130 to 150 miles contiguous to the sea-board, there exist deposits in large caves which have yet to be thoroughly opened up and explored. Arrangements have been made to bag and convey to the beach, whence it will be conveyed to Fremantle, about 20 tons of this friable semi-soluble fertiliser, which will be thoroughly tested this summer, both at the Hamel Experimental Farm and under irrigation at the Brunswick Dairy Farm.

The immense value of the recent discoveries can only be appreciated when the statement is made that in three of the thirty odd caves known to exist in the immediate neighbourhood, there are actually in sight 10,000 tons of the fertiliser, and that within the limestone hill formations extending over 150 miles or so yet to be developed, there are a score or so of similar groups of caves.

That country along the Moore River where phosphatic deposits were first discovered is held by land owners. The find was such as to lead Mr. Goezel to follow the limestone locations north, and as a result of his discoveries, all the country wherein the caves have been located has been reserved from selection.

Other phosphatic formations which have lately been located in the neighbourhood of Dandarragan have been reported on by Mr. Rowley, Analytical Chemist, engaged on research work by the Midland Railway Co., and also by the Geological Survey Department. That formation appears to be of such an extensive nature that there is every indication that within a very short period Western Australia will cease to be an importer of phosphatic fertilisers, and that local finds will be able to supply at a moderate cost the growing requirements of our agricultural lands.

As phosphatic deposits were being located, extensive formations of gypsum were also reported from a number of localities adjacent to our farming districts. At Wagin, Pingelly, Cowcowing, Wyola, Hine's Hill, Carnamah, Dongarra, and a number of other localities extensive deposits of gypsum have been located and, as a result, our farmers are now able to buy at a very nominal rate gypsum of good quality, containing 50 to 80 per cent. of sulphate of lime. The more general use of this soil improver cannot fail to hasten the spread of the sweeter herbage, notably the trefoils and clovers, and lead to a general improvement in our crops and stock.

Wine.

In the face of crushing odds our wine industry continues to put up a valiant fight for the retaining of its home market.

It is recognised on all hands that for quality West Australian wines have won for themselves a reputation which has been recognised wherever they have been shown.

The wine output, which obtained its highest point in 1906 when 208,911 gallons were made, decreased by 13,251 gallons in 1907, while in 1908 it is given as 153,755 gallons or practically what it was six years ago.

It is freely admitted amongst vine-growers that Federation has dealt more severely with that promising industry than with any other agricultural industry in the country.

Legislation calculated to restore vine-growing to the rank it once occupied would afford considerable relief to the industry, and lead to the employment of much labour over an extensive area of particularly well adapted country.

Fruit Production.

The development of our fruit industry in Western Australia continues to be very marked. Irrespective of vines the acreage under orchard which was in 1898 2,925 acres, increased in 1907 to 12,517 acres. Of this there were under apples 5,853 acres, under pears 940 acres, and oranges and lemons 1,836 acres.

Orchard planting has steadily increased at the rate of about 1,000 to 1,500 acres for the past 12 years, and the same rate of planting promises to be maintained for some years to come. In spite of this rapidly increasing extension the total number of cases of fruit imported into the State was:—In 1906-7 62,424 bushel cases; of this number 20,639 cases were apples.

The following are the districts showing in 1907 the largest acreage under apples and pears:—

	Apples.	Pears.
Swan	658	156
Wellington	935	117
Katanning	621	109
Blackwood	1,082	106
Plantagenet	1,032	106

The following figures show a comparative statement of fruit exported from the State:—

Variety.	1906. From 1st June to 31st Dec.	1907. From 1st Jan. to 31st Dec.	1908. From 1st Jan. to 30th April.
Oranges	1 cental ...	31 cental = £41	Nil
Apples	8 cental = £17	339 cental = £447	953 cental = £1,173
Others ... ..	...	...	447 cental = £708

The exportation of apples is, as will be seen, still in its infancy, but promises to increase at a very rapid rate.

As compared with Tasmania and Victoria, which have one acre of orchard for every 10 and 21 head of the population respectively, Western Aus-

tralia, 12 months ago, had one acre of orchard (irrespective of vines) for every 20 head of population (irrespective of blacks).

Since then we have increased our orchards by 2,301 acres.

Values of Fruit and Vegetables and Potatoes Imported into Western Australia in:—

	1897.	1906.	Total for ten years.
	£	£	£
Bottled and Tinned Fruit	32,049	42,539	410,511
Preserved Vegetables ...	18,473	(Included in above figures.)	
Green Fruit ...	20,037	36,249	283,808
Fresh Vegetables and	} 1,324	{ 366	5,796
Dried and Concentrated			
Pickles and Sauces ...	17,858	25,533	206,626
Jams and Jellies ...	52,324	62,337	519,789
Currants ...	5,314	6,195	56,735
Dates ...	1,719	1,566	14,920
Raisins ...	5,159	7,130	59,847
Dried Fruits, N.O.E. ...	6,091	4,732	47,356
Nuts ...	2,885	5,480	40,637
	£163,233	£193,845	£1,652,941
Potatoes ...	£43,795	£99,242	£558,656

Narrogin State Farm.

During the year the number of students fluctuated from 18 to 24. A large proportion after a course in practical farming extending over six to 24 months become settlers on the land.

For the past two year, but more particularly last season, a system of cropping for the first time thoroughly practised on the farm, and one as yet new to the district, has been inaugurated with most satisfactory results. All sowing is done on fallow land. This practice permits of early seeding in the autumn before the land becomes thoroughly wet. The crops get a strong stand before the heavy winter rains set in. This work is made easy on the teams, while the fallowing for next year's sowing is done as the wet state of the ground permits, right up till the late spring, when after feeding down the grass on the fallow, the scarifier is run over it. This is done before the teams are engaged on hay-cutting and harvesting.

In this way one man alone with a team of four horses and a three-furrow stump-jump plough, a set of spring-tooth harrows, a seed and manure drill, and a harvester, is kept going all the year round, and is allotted the task of drilling and harvesting 250 to 300 acres of land, and ploughing and scarifying another 250 to 300 acres of land.

The practice on some of the most successfully conducted farms in our wheat areas is now to provide such an equipment with a team of horses in charge of a capable ploughman for every square mile section of the farm.

Besides hay and corn-growing, a good deal of attention is given at Narrogin to the feeding off of root crops by lambing ewes and fattening sheep. It has now been satisfactorily demonstrated that on the shallower soil in the moister districts, turnips constitute a more reliable crop than does rape, and

the lesson taught at the State Farms is likely to be widely copied by stockmen throughout the country.

Narrogin, like the districts around, is better suited for sheep than cattle, although it becomes evident that as the land is cleared, fertilised, cropped, and stocked, a more nutritious herbage replaces the thin, unsustaining silver grass, and cattle correspondingly improve in character.

During the year a source of fresh water for the farm has been supplied by the opening of a soak, half a mile from the quarters. That soak is situated on a slope 36 feet higher than the ground level at the homestead, so that water is easily run down by gravitation to a receiving tank whence it is distributed over the buildings.

A new 75-ton silo has been constructed close to the first one erected last year, and plans are now prepared for the construction alongside of a cowshed capable of housing 16 cows.

New piggeries will also be built at the new homestead in order to centralise all the stock, some of which for lack of proper accommodation are kept at the old homestead.

Trial plots of grasses, fodder plants, wheat and other cereals, have been greatly extended, and afford for both students and visitors information which cannot be supplied anywhere else in the district.

Chapman State Farm.

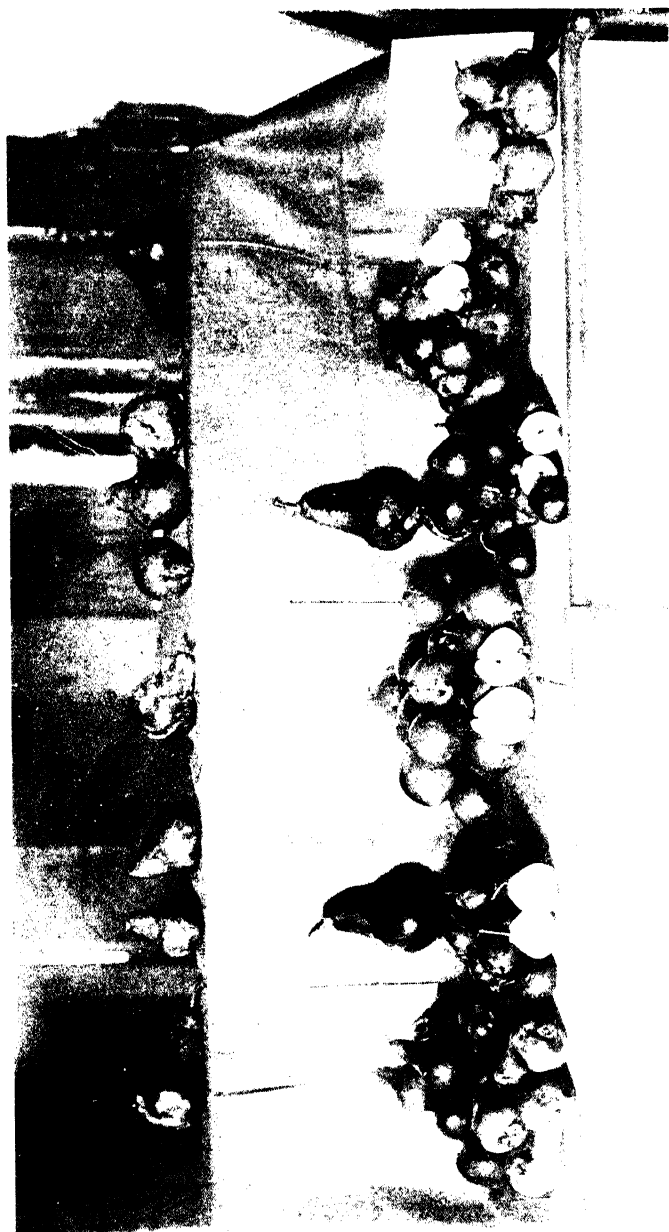
The disadvantage under which this farm has laboured in the past in regard to distance from a railway station is shortly going to disappear. The survey of the Chapman River railway, which will connect that rich agricultural district with the port of Geraldton and with the rest of the railway system, runs through the corner of one of the fields. This part of the State presents in many respects more favourable advantages to the successful conduct of mixed farming than do most of the other State farms.

Both climate and soil lend themselves to successful stock raising, while the wheat average is high. It amounted last year to 17 bushels per acre, while this season, when the general yield is expected to be generally low, it is estimated at over 14 bushels. This result is due to the more thorough preparation of the soil. It is the aim of the management to sow every inch of corn on fallow land; and the object lesson conveyed is certainly more striking when travelling in a season like this through the surrounding country, where short crops are very largely in evidence. Out of a total of 1,275 acres there are at present an area of 700 acres cleared. Of this, 300 acres is a cultivated fallow, ready for sowing early in April.

The farm carries 650 sheep, 30 Angora goats, 26 head of cattle, about 100 pigs, and two teams of horses. One of the features of the Chapman Farm is the production of seed grain, more especially wheat and malting barley. The number of varieties of wheat has been reduced out of a large total originally experimented with to about a dozen, which show more particular adaptation to the conditions of our wheat land.

The Chapman wheats, it might incidentally be mentioned, were awarded the Grand Prix, which is the highest distinction in the wheat class, at the Franco-British Exhibition. The varieties now favoured on the farm are:—

Alpa, Baroota Wonder, Bunyup, Correll's No. 5, Golden Drop, Huguenot, John Brown, Jade, Plover, 73A, 100A. Of barley the following varieties have done remarkably well:—Chevalier, Standwell, and Cape Barley.



Cod-Sponge Fruit-Pears

Rye has been most successfully grown on the lighter soil, and is certainly a crop which is worthy of more general recognition for much of our sand plains and other soil not so well adapted to wheat or oats.

Root crops and rape have proved a pronounced success for the feeding of both breeding ewes and pigs during the winter months, and their cultivation should from now on form part of the rotations on this as well as on farms in the country around.

Among the other experimental crops grown at the Chapman Farm are:—

Cotton, which, under present conditions of cultivation, has not proved a success.

Sisal hemp, of which two acres have been planted from off-sets introduced from Queensland. These plants have been put in at a very low cost, at distances 6ft. apart along furrows ploughed every 9ft. over-shadowing shrubs having been knocked down. Of these, about one-half are growing. The off-sets were naturally somewhat heated on the cases being opened after the long journey from the plantation in Queensland, and it is expected that better success will follow the planting of locally raised suckers and bubs.

Nangeenan State Farm.

Of the several State Farms, Nangeenan is the furthest from the long recognised agricultural centres. In many respects it was the means of demonstrating the capabilities of the extensive stretches of Salmon Gum and Gimlet Wood forests, which occupy a vast portion of our best wheat and grazing land. If, however, the soil is all it is desired, if the clearing of the forest can be effected at a very low rate, the rainfall is on the other hand somewhat on the light side. During the past season 8½ inches of rain have only been recorded during the growing months, April to October, and severe frosts did a lot of damage to what was pronounced to be a remarkably promising crop. In spite of these disabilities, a hay crop estimated at one ton to the acre has been secured, and there is no reason to doubt that, provided the system of only sowing on cultivated fallow which was introduced a few years ago is proceeded with, better results will be attained in more propitious seasons.

New piggeries will be provided at the Nangeenan Farm, where the nucleus of probably one of the best herds of Berkshire pigs now in the States has been established.

Small irrigation plots have been started, advantage being taken of the proximity of the Goldfields Water Supply main, and the consequent growth of lucerne, turnips, and fodder crops and vegetables has afforded testimony of the value of more largely using that source of water for the purpose named.

By sowing a small field of turnips either immediately before or towards the end of the rainy season, the use of a moderate amount of water only would be necessary, and a safe reserve could be provided for the ewes in lamb in the early winter months before the natural feed becomes sustaining.

The area of land at the Nangeenan Farm comprises 2,088 acres, by far the greater portion of which, viz., 1,688 acres, is first class land, capable of yielding large returns under a system of dry cultivation adapted to arid localities. Of the area named 770 are cleared, 210 chains of rabbit-proof fence run along two sides of the farm, and there are, besides 11 miles of

fencing, buildings of the type of a well appointed farm which could without extravagance supply an object lesson in farming in a dry district.

The following is a statement of expenditure and revenue at the State Farms:—

Narrogin State Farm, 1907-08.

Expenditure to 30th June.

	£	s.	d.	£	s.	d.
Salaries	410	0	0			
Farm wages	240	14	0			
Seeds	35	4	7			
Fertilisers	100	1	1			
Contingencies—						
Bags, twine, feed,						
freight, stud fees,						
repairs, sundries..	574	0	0			
				£1,359	19	8
Household salaries and						
wages	304	12	2			
Provisions	556	1	1			
				860	13	3
				£2,220	12	11

Revenue to 30th June.

	£	s.	d.	£	s.	d.
Seed corn	186	0	0			
Under crop on fallow						
land, 517 acres at £1 5s.	646	5	0			
Fallow, 80 acres at 8s.	32	0	0			
From Sheep	602	15	0			
„ Pigs	81	6	2			
„ Poultry	242	4	1			
„ Cattle	10	0	0			
„ Goats	14	12	6			
„ Horses	47	12	6			
Experiments, Estimated	250	0	0			
				2,112	5	3
Students' fees				145	0	0
				£2,257	5	3

Chapman State Farm, 1907-08.

Expenditure to 30th June.

	£	s.	d.	£	s.	d.
Salaries, wages, and keep ..				470	0	0
Seeds	21	19	0			
Fertilisers	46	12	6			
Contingencies: bags, twine,						
feed, freight, repairs, and						
sundries	224	0	0			
				292	11	6
				£762	11	6

Revenue.

	£	s.	d.	£	s.	d.
Seed corn and hay	393	18	5			
Under crop on fallow land, 243 acres at £1 5s. ..	303	15	0			
Fallow, 77 acres at 8s. ..	30	16	0			
From sheep	109	14	8			
„ pigs	101	0	6			
„ poultry	7	6	0			
„ cattle	18	8	6			
„ goats	32	8	0			
„ horses	12	3	0			
„ stores, etc.	69	19	0			
Experiments, estimated ..	100	0	0			
				£1,179	9	1

Nangeenan State Farm, 1907-08.

Expenditure to 30th June.

	£	s.	d.	£	s.	d.
Wages and keep	356	8	0			
				356	8	0
Seeds	12	16	10			
Fertilisers	50	10	0			
Contingencies: bags, twine, feed, freight, repairs, stud fees, water, sundries ..	274	1	0			
				337	7	10
				£693	15	10

Revenue to 30th June.

	£	s.	d.	£	s.	d.
Corn and chaff	61	14	3			
Under crop, on fallow land, 328 acres at £1 5s. ..	410	0	0			
82 acres fallow	32	0	0			
Paddocking cattle and labour (5 months) ..	87	10	0			
From Sheep	49	12	10			
„ Poultry	5	9	4			
„ Sundries	20	10	9			
Experiments, estimated ..	100	0	0			
				£766	17	2

Brunswick State Farm, 1907-08.

Expenditure to 30th June.

					£	s.	d.
Salaries	..	..	..	..	132	0	0
Wages	..	..	..	..	448	13	6
Seeds	..	..	..	..	16	5	8
Fertilisers	..	..	..	..	61	19	9
Fodder	..	..	..	..	284	15	5
Contingencies	..	..	..	..	197	7	0
					£1,141	1	4

Revenue to 30th June.

					£	s.	d.
Milk and cream	..	..	..	..	416	1	5
Stores	..	..	..	..	26	17	6
Stud fees	..	..	..	..	1	5	0
Crops, 90 acres	..	..	..	..	217	10	0
Calves	..	..	..	..	347	4	0
Pigs	..	..	..	..	45	0	0
					£1,053	17	11

Honey Export.

During the year the Beekeepers' Association secured the assistance of the Department to send to London a shipment of West Australian honey, in order to test the market.

This step was prompted by the unsatisfactory position of the honey industry as it stands at present in the State.

It is said that except during seasons when natural blossoms are peculiarly scarce, the State demand for honey is fully met, and for want of some sort of organisation sellers so cut down prices that wholesale merchants are not able to offer to producers a price which will induce an increase of production.

On the other hand, indiscriminate exportation in the past has given to Australian honey in England a bad name, which has been used by large dealers connected with the honey trade to work their own ends.

For the purpose of promoting a more favourable appreciation of our West Australian honey, a consignment specially collected by the Beekeepers' Association was sent to the Agent General in England. A request was at the same time made to have that honey put up in attractive form and placed on the market. It was thought that the West Australian Court would materially help in this work of distributing the honey in conjunction with others specially conversant with the trade.

The result as reported by the Agent General has been anything but satisfactory and, instead of the anticipated prices of 4d. to 5d. per lb., the consignment was sold at 15s. per cwt.

From a trade notice to hand it would appear that the masses in England have not up to the present considered honey a part of their daily food to anything like the extent obtaining in Australia.

The average price of honey imported into the United Kingdom last year was about 25s. 6d. per cwt., French honey selling for 50s. per cwt., West Indies 22s., the United States of America between the two with an average of 26s. 6d.

Altogether the imports into the United Kingdom from all sources only amounted to the small total of 26,354 cwt., valued at £33,397.

Importation of Stock.

During the year the Department introduced for sale on long terms to settlers:—

Dairy Cows	..	..	..	..	521
Breeding Ewes	..	..	..	..	21,562

Since then another 2,448 ewes have been distributed, making a total of 24,010 ewes, while another 2,000 are expected.

Altogether 267 settlers have received stock on long terms from the Department, and the number now on order will bring the total up to 26,010. When this lot will have been distributed, 280 farmers will have benefited by the exceptionally liberal terms at which the stock is sold.

The terms of repayment extend over two years in eight equal quarterly instalments in the case of the cows, and two equal yearly instalments in the case of the sheep.

In each instance interest at the rate of 5 per cent. is added and adequate security is insisted upon.

The first year it was sought by importations from outside to increase the number of cows and ewes in this State. Experience, however, has taught the lesson that stock of at least equal value could be bought locally and at a more reasonable cost, with the additional advantage that they were already acclimatised and therefore more likely to accommodate themselves readily to local conditions than do imported stock.

Acknowledgment.

It is again my pleasant duty to acknowledge the valuable advice which the Department has continued to receive from Mr. D. McAlpine, the Vegetable Pathologist of the Department of Agriculture, Victoria; of M. A. M. Lea, the Government Entomologist of Tasmania; as well as for courteous information given by heads of departments and agricultural specialists in the Eastern States.

A. DESPEISSIS, M.R.A.C.,
Under Secretary.

ANNUAL REPORT OF THE MANAGER GOVERNMENT
REFRIGERATING WORKS ON THE COLD STORES,
MARKETS AND ABATTOIRS.

To the Under Secretary for Agriculture, Agricultural Department, Perth.

GOVERNMENT REFRIGERATING WORKS.

I have the honour to forward herewith the 11th annual report of the Government Refrigerating Works, Perth, the Perth Markets report, and the report of the Government Abattoirs.

The year just ended was not favourable as a whole for cold storage and ice manufacture generally. We had comparatively little summer, and this combined with keen competition in the business somewhat affects our returns.

We were kept very busy the whole of the year with cold storage work, and had a fair output of ice business, but neither the return for cold storage or ice is now like what it was a couple of years ago. Still, we have a good credit balance on the year's operations.

The one redeeming feature of last year's work, and the same feature is practically apparent at the present time, is that the winter in Western Australia, instead of being the off season and all the works shut down and practically idle, is now the busiest and most remunerative part of the year. This has been brought about solely by the efforts of the Department to popularise the storage of fruit. There is probably no branch of field or orchard product that has been so enthusiastically taken up by growers as that of cold storage of apples and pears in this State.

The machinery ran without a hitch during the whole year, and the cost of repairs, maintenance, chemicals, and labour is low. We had a good deal of what is not directly remunerative work, in storing exhibits for Agricultural Societies and Departmental work generally. Through the success of the Metropolitan Waterworks in finding ample supply of water elsewhere, we were able to negotiate successfully and economically for the use of the Wellington Street bore. This was the first season in the history of the works that a reliable supply of water was assured at all seasons. We are now in a position of independence so far as water is concerned. The temperature of bore, though relatively high in the winter, is of sufficient volume to allow a larger quantity when necessary.

Two years ago we received a very favourable notice from the *West Australian* on the Show held in Bunbury in the early spring. A few cases of cold storage fruit exhibited then evidently set people thinking. The cold storage fruit subsequently at the Industrial Exhibition in December, 1906, together with the fine display at the Royal Agricultural Show in October, and the Bridgetown Show at the end of November, has practically revolutionised the prospects of the Western Australian fruit grower.

For the first time in the history of the State we stored one hundred cases of locally made butter for Messrs. McFarlane & Co. of this City. This was made from South-Western cream, and it kept in excellent condition for about four months, and had a rapid demand. This small parcel, although but a drop in the bucket of our State's consumption, is worthy of note, and we

have great pleasure in chronicling this further expansion of local supply meeting local demand. Three short years ago the storage of local products was insignificant. Fruit, mutton, and eggs are rapidly increasing, and now butter enters the arena. The tide is turning, and Western Australia is coming to her own. During the months of February and March, on the instruction of the Hon. the Minister, a cold storage car ran daily to the South-West. The result, though small, anticipated any possible outbreak of criticism usually looked for in the hot season from a large and ill-informed class of patriots, whose hands are out of touch with the axe or the spade, and whose waist lines bespeak the public park type of Dry Farmer.

The Producers' Conference held in August last, in discussing the cold storage problem, to which we contributed a short paper on "Cold Storage for Producers," looked upon the possibilities of cold storage as a direct incentive and encouragement to their work as a very live thing, and there was a certain tone of regret in most of the speakers' remarks, that they had known so little, and done so little with the means that lay for years immediately under their noses, but not as yet availed of.

The fruit growing section of delegates of that conference, who paid several visits to our works, together with the lamb growing section, who saw samples of the cold storage goods, were all, without exception, more or less ignorant of what was being done outside of Western Australia for Western Australian consumers, or what could be done in Western Australia for local or over-sea markets.

That the Producers' Conference of 1907 was one of the most successful ever held in Western Australia is a matter of history, and it was the first Conference to seriously discuss cold storage, and back up such discussion by sending a respectable quantity of lambs and a large proportion of their fruit to the cold store, it is sufficient evidence that they were sincere in their beliefs, and were plucky enough to meet a loss if need be, so that the products of the State might be known and its good and bad points studied and rectified.

The fruit growing delegates after seeing the effect of long distance carriage of fruit were duly impressed with the necessity of greater skill in packing and the other needful essential of grading to size and colour with a degree of uniformity.

The King River people are not likely to be satisfied till they have a cold store in their own neighbourhood for their own use. This is also the desire of the Bridgetown district. The great drawback to Central Cold Stores in Perth is that often fruit being transported long distances at the beginning of its storage life suffers from rough handling, and, while waiting at the store for the market, there is a larger percentage of wastage and reject stuff than with the same stuff stored carefully in the immediate neighbourhood of the orchard and then travelling to Perth or the Goldfields, later in the year, say September or November, after its storage life was practically completed.

Conference delegates not immediately interested in fruit, during their visit here, critically examined Eastern samples of frozen produce. At the time of their visit we had a very fine supply of pork, mutton, poultry, and dried fish, which interested them considerably. The splendid model of the dairy-fed pig of Victoria, which is one of the most perfect samples of its kind, was carefully studied from a heap of a couple of hundred carcasses lying on the floor. The points noted were that careful selection had eliminated the ears and tails down to a few ounces, and allowed the carcase to be made

into pork chops from the hind foot joint to the end of the jaws of the head if need be. This was a source of wonder and amazement to the farmers, who are not unfamiliar with the long-legged, long-nosed, long-eared, high speed, tree-climbing variety of the Western Australian pig, which had not in many cases improved by its environment and inbreeding.

The lamb and sheep models of medium weight, *i.e.*, under 50lbs., were also overhauled and the proportions noted by the sheep raisers. The stiff light frames of the Cross Breds, with their nuggety hind-quarters and heavy fore-shanks, together with the outside coating and fat and the healthy bloom apparent after a few months storage, gave them an idea of what is expected from the breeder, and, contrasted with others who had a large infusion of the Merino blood in their veins, the deputies could study and think over the advance made by their Eastern contemporaries in mutton-raising for the cold store.

While the question of price at which this imported product was broadcast in Western Australia tended to discourage anyone who had a poor tract of country, it also was a source of stimulus to farmers who were already successful mutton growers, and, doubtless, demonstrations of this sort, if made regularly and frequently for the benefit of the man on the land, would go a long way to educate him to the interpretation and appreciation of the London markets reports, published from time to time in the daily Press, of how our stuff fares at Smithfield compared with the more advanced mutton breeders of New Zealand and the other States.

Delegates interested in poultry had also ample demonstration of the frozen poultry export work of Victoria, which at all times commands respect, and is probably the finest cold storage product turned out in any part of the world.

Victorian turkeys, ducks, ducklings, chickens, and boiling fowls, as well as some of the wild game, skewered and ready for the grid-iron of the chef, opened the eyes of the delegates to Western Australia's need of table poultry. While all professed keen interest and wide knowledge of the various breeds for egg-producing standpoint, they confessed that the distances to travel before we could hope to emulate Victoria in the excellence and uniformity of her cold-stored table poultry was considerable, still, no one seriously considered such perfection unattainable.

The fruit crop of 1908 was not expected in many quarters to yield much work to cold storage, but fortunately the forebodings and predictions of a good many have not been realised in this direction, for at the moment of writing the cold stores in Perth contain as many as they did last year at the same period, while quantities are being held in Bunbury and Northam.

Further, the quantity is not the only guide to the observer, as the quality is a long way superior all round than last year, and the grading has considerably improved.

The apple and pear crop of Western Australia this year has a larger percentage in cold store than probably any other State in Australia. During the writer's late visit to the Eastern States the quantities of pears of the more delicate variety seen in cold store were hardly worth mentioning, while the large quantities of apples that were often met with in the cold stores and Government depots were only there for a day or so, or a week at the most, to be chilled down before going aboard the ship. There did not appear to be anything like the same amount of interest taken in the local supplies of fruit

for the cities of Adelaide and Melbourne in storing at the cold stores for long storage as there is in Perth, but no doubt some of the larger orchards have very respectable cold stores of their own. There are on the markets several make-shifts of more or less ingenuity for cooling and humidifying air, as well as various ideas for ventilating and drying air in orchard cellars and barns, but the whole lot of them, taken at their highest value in a climate like Western Australia, are only so much waste of money for the preservation of our apple crop.

During the year several adverse comments were made in the country papers about people in their respective districts not meeting with the amount of success they anticipated in selling their fruit after storage. There were several reasons for this failure. If the man two or three hundred miles away gives his agent a free hand, and his agent is an auctioneer trying to keep his connection up, he generally draws on the fruit he has in store, irrespective of the condition of the market, and keeps his clients going at the expense of the man in the country. On several occasions our clients wrote to us, asking for information as to how their fruit was progressing, and we had to inform them that the man in whose hands they had placed their business had sold it and had not kept them posted. This caused a good deal of discontent and had a tendency to lower the value of cold storage of fruit in the eyes of the men in the country, and would have been the cause of considerable loss to the cold storage business had it not been utterly refuted by the display at the Royal Show in October, and particularly at the Bridgetown Show held at the end of November. We requested the Secretary of the Bridgetown Show and Society to make a clear distinction between fruit exhibited from the Government Cold Stores, and compare it with stuff locally stored in cellars, barns, etc. His letter is as follows :—

“ Bridgetown, 20th December, 1907.

“ I must apologise for keeping you so long without sending a report on the splendid exhibit of cool storage apples sent from your works, for exhibition (after eight months storage). I have been exceedingly busy with fixing up my show, which was a record one, and with other work that got behind while attending to my show, which required to be fixed up immediately.

“ No doubt you have seen from the *Morning Herald* report the feature of the show was the exhibit of cool storage apples. I herewith enclose you the judge's report on same, which I trust will be acceptable, and I can only endorse his remarks that visitors were of opinion that the fruit shown was a splendid advertisement for the district as well as showing what can be done by cool storage, combined with careful grading and packing, and there can be no doubt that cool storage is far above other methods of storage (as shown by the one exhibit of barn storage) compared with the cool storage fruits exhibition at the show, and which fruit-growers must avail themselves of if they aim to make their fruit-growing pay. Had the fruit arrived as I desired on the 26th we could have made a better display in arranging the fruit. The fruit did not arrive here until the evening of the 27th, and consequently did not reach the ground until 8 o'clock show morning. The fruit had to have the cover and wrapping taken off and ready for judging by 10 o'clock, so you will see that there was not much time to arrange them to the very best advantage (but that was not your fault, but that of the railway). However, there can be no doubt that the exhibit was a splendid object lesson of what can be done and will be done, and I trust it will be the means of your having an increase of business during the coming season, as several fruit-growers have expressed themselves that they will avail themselves of the cool storage. I have to convey to you from the Council of my Society a vote of thanks for the care and attention and kindly interest you have taken in the exhibit.

(Signed)

THOS. ROSSITER, Secretary.”

[Enclosure.]

“ Judge's Report: In my opinion the 35 cases of apples shown, probably made the finest display of cool stored apples yet shown in Australia at the end of November, and I am glad to learn the opinion was shared by Interstate visitors interested in fruit export.

It is particularly worthy of note that some 20 cases opened without a damaged fruit and looking as fresh and perfect as if just picked from the trees. Many of the cases had only a few damaged fruits, while two cases only were really bad, due probably to the fact that the fruit was sent in a bruised and over-ripe condition to cool stores. The honours were awarded to a beautiful case of “Dunn's Seedling” exhibited by Mr. A. Muir. The apples in the case were particularly well graded and well packed, being of a nice medium size. The wrapping paper, however, appeared a little heavy. Second place was given to Mr. J. Allnutt with a seedling variety of his own, named “Allnutt's Gem.” The apple was the most perfect and finest flavoured in Show, also beautifully coloured, but unfortunately the fruit was badly graded, otherwise the case would easily have secured the first place. The next best was a case of good medium-sized Nick-a-Jacks of even size and well coloured, shown by Mr. W. Mottram. The several cases of Yates, both wrapped and packed without wrapping, opened in splendid condition, and the flavour was simply perfect, but the fruit was not graded or evenly packed. The many cases of Rokewood were all as fresh as possible, but of course the quality of this variety debars it from a place in so keen a contest. A beautiful case of Cleopatra, exhibited by Mr. Williams, deserves special mention for careful packing and wrapping, unfortunately a few samples showed bruises, and had to be passed over. Rome Beauty were mostly too large, and some samples were showing signs of decay. Jonathan, the one case shown, was past its best. There was only one case of Rokewood not for competition, that had been kept in a storeroom only; The fruit, although sound, showed up very shrivelled compared with the cool stored fruit.

In conclusion, I consider Mr. Layman, the member for the Nelson District, deserves the thanks of the fruit-growers of the South-West for instituting the competition, through the offer of his handsome special prize, which has been the means of proving the wonderful possibilities of cool storage for the apples of the district; and Mr. Cairns, of the Government Refrigerating Works, deserves special credit for the care and attention he must have bestowed on these fruits.

(Signed) J. HAWTER, Judge.

“ I consider the report given in the *Morning Herald* a very good one.”

The following letter was also received from the Royal Agricultural Society, dated 17th December, 1907 :—

“ Your letter of the 4th ult. was placed before my Council on Tuesday last, and I was instructed to state that they consider the result of the cold storage of the fruit exhibited highly satisfactory, the appearance and quality being remarkably good. I heard no adverse criticism given by any of the exhibitors. The prize winners are apt to be lenient on such occasions, but the disappointed ones not so, unless except under some such satisfactory and successful treatment. The cold storage of the fruit enabled my Society to have a most encouraging display of fruit, which would be under other circumstances impossible, and my Council desire me to thank you personally for the great interest you have always shown on the well-being of their Society

(Signed) THEO. LOWE, Secretary.”

These letters should satisfy any of those timid individuals who were afraid of their stuff not turning out well. The common saying, “Condition is of more importance than quality,” was borne out to the fullest with every variety handled during the whole of the year.

The following letter received in May last from the Pingelly-Mourambine Agricultural Society, under date 2nd May, 1908, testifies to the condition

of fruit which had been here 13 months, and will prove to the sceptic that if we cannot improve his stuff, we can hold it, if it is sound. The letter reads :—

“ I desire to inform you that the balance of the fruit placed in the Government Refrigerating Works on March 22nd of last year (1907) was received and opened by the members on Saturday, April 25th, 1908, and I am directed to write to you stating that they are perfectly satisfied with the trial and that this test fully demonstrates the advantage of cool storage. The fruit opened, after being in the Refrigerating Works for 13 months, in a splendid condition and proved to be as fresh and luscious as when it left our hands in 1907, and was equal to the present crop just gathered.

(Signed) A. A. KENT, Secretary.”

The great difficulties fruit growers have to meet, is not what happens at the storage end, but what happens through the soil and poverty of a location that encourages pests, and the worst of these pests cannot be eliminated by cold storage. “Black Spot,” “Bitter Pit,” “Water Core” or “Core Mould” will assert themselves at some unlikely time or place, and the only cure is in the hands of the grower, cultivating and properly attending his trees at his end of the question.

Our running expenses were increased by the 12 per cent. advance on the price of Collie coal, early in the year, also the tariff changes in August materially increased the cost of engine-room stores, and notwithstanding the effect of a cool summer and keen competition between other works in the State, a substantial credit balance has been earned over working expenses, which will no doubt be a source of satisfaction to the Department in their endeavour to maintain an equitable rate in the cold storage business of this State.

We successfully held seed potatoes from season to season, and carried out a lot of experiments with fruit and eggs, practically to the ultimate end of such products. We frequently sent samples of materials under test to the respective societies to show them the progress of their products under cold storage conditions, and maintained correspondence with the various societies as usual during the whole of the year.

Tabulated results further on in this report will show you the extent of our work with certain varieties during the year. Singular contradictions to these results have already shown themselves with the new season's fruit, in so far that in many instances fruit that was absolutely perfect as far as could be expected last year, and which kept the longest period in a most perfect manner, shows that apples and pears from the same trees for the crop of season 1908 had not the same resisting power or freedom from disease that it had in the former season.

Cleopatra apples, always known as somewhat capricious, like some of the finer varieties of early pears, in one instance showed fruit as clean and as hard as could be wished in one season, and was followed by a crop that was absolutely full of “Bitter Pit” before they were off the trees six weeks.

The great pest of 1907 hot summer, fruit fly, did not make itself felt this season at all. Fruit showing fly punctures was very rare indeed, although the fruit crop as a whole is said to be small. The coldness of the early summer was compensated for in a great measure by the excellence of the general average immunity, and the sure certainty that there are not so many fruit fly maggots to be looked for next year. The “Black Spot” showed itself

JOURNAL OF AGRICULTURE, W.A.

rather frequently in Jonathans this year, and seems to have been the common experience throughout Australia.

The writer saw many thousands of cases at Adelaide, which were loaded on to the *Carpentaria*, also the shipments of the P. & O. from Melbourne early in February. Samples brought here of both shipments showed developments of Black Spot before a month was over, and the subsequent report of the sale of both these shipments in London well corroborated the presence of Bitter Pit and Black Spot being prevalent to a considerable extent. Fruits affected with either of these pests should not leave the State, and should be used up immediately after coming off the trees, when the trees are known to be affected.

The examiner under the Commerce Act, which is now in operation, may in all good faith sign his declaration that the fruit is free from all disease, but the fact remains that these disfiguring blotches develop and increase in a few weeks' time, and probably the conscientious inspector would not know the stuff he passed in Australia as absolutely sound if he saw it after six weeks' storage before it reached the British market.

Tasmanian fruit-growers and others in the East, who made such vigorous attempts to have Sir William Lyne modify his Commerce Act, on the plea that fruit was not a manufactured product and capable of adulteration, and was not therefore subject to the Act, were not successful in their protestations, and whether any Act could guarantee the conditions of a commodity landing in a foreign market may be a debatable point. One thing is evident, that the grower who has a pest-free orchard with well cultivated and well nourished trees, with an output of hard, round, sound, well-packed stuff to send to the ships, and will stand the endurance test of cold storage, has the truest and most practicable and payable solution of this problem in his own control.

The aim of the Commerce Act to send the best we can produce is a splendid standard to work up to, and doubtless the effect of having special officers at the seaports to examine critically and carefully the goods as well as the markings, must be to the benefit of the grower. Some modifications may be expected in the exacting requirements, whereby a great deal of stencil work has to be done, as such stencilling cannot always be done on the empty case. I noticed at both Adelaide and Melbourne fruit shipments, a tremendous lot of tossing and mauling about to see and check the various brands prescribed by the Commerce Act regulations. All this extra handling means loss to the grower, and the place for the examiner should be at a central dépôt, where everything is systematically handled and skilfully checked.

COLD STORAGE NOTES, 1908.

Stone Fruit.—Very little stone fruit passed through cold storage this year, owing to lateness of summer and shortness of crop. Growers in many cases had not more than 5 per cent. of peaches and apricots that they had the previous year. We had a few cases of Salway peaches for a client which were picked up in the open market, and held for about nine weeks in the cold store, with very little deterioration, and they brought a very handsome price at the time of selling. This peach, together with the Lady Palmerston, is capable of standing cold storage for a considerable time, and there is little doubt about it that when our real surplus of stone fruits come, this variety can be relied upon to stand the journey to Great Britain, under anything like fair conditions. The Salway peach is a stayer, and there can be no

question about the future of this variety from a cold storage standpoint. We have seen them here plucked in March, retaining a great many of their original qualities, shape, colour, and flavour to the end of September. Of course they had shrunk considerably, and certain changes in the flavour had taken place, but there is no question of the fact that the Salway peach is far ahead of any peach in W.A. for staying power, so far as our knowledge goes by cold storage test.

The United States Department of Agriculture have given peach storage a considerable amount of attention, and their report, although somewhat elaborate, is very instructive reading as a whole. Varieties they name may have several distinct features of their own, but very few of these varieties are identifiable on the local list here. We kept the peaches at 33 to 35 F. throughout the whole period.

The United States authorities state:—"The effects of three kinds of storage on the composition of peaches were studied, the fruit being stored at the time of market ripeness. First at the ordinary room temperature in the summer time, the temperature ranging from 77 to 86 F., second in cold storage at 32 F., third in an ordinary refrigerator at a temperature of from 53.6 to 59 F. In all forms of storage, the weights of the peaches decreased. This loss in weight was not entirely due to evaporation of water, for a diminution of solids in the flesh occurs in all cases. The peach is short lived, and in best remains in good condition, in fact remains alive, but a comparatively short period of time; whereas the apple may be kept for months, or even a couple of years, in such condition that the cells are apparently able to perform their natural functions, though to a somewhat diminished extent."

Grapes.—The prize given by the Royal Agricultural Society for samples of grapes was not very heartily taken up by the vine-growers. One enthusiast, however, saved the situation with an assorted case. This one solitary case was necessarily an object of great attention, and far too frequent inspection, which in a great measure spoilt the final exhibition. However, there were some fair samples out of the lot to be seen at the Royal Show and there is no question at all that a few weeks previous to the Royal Show some of the samples were wonderfully well preserved. Observations of the behaviour of grapes after a winter is over, and when fresh shoots are to be expected on the parent stem, seem to be an index that the life of the grape is complete. The decay and dissolution are very rapid after this point. We have much larger samples this year in stock, and everything being equal, we ought to be able to have a few good bunches at the end of six months' storage. Sample case last year consisted of Doradillo, Centennial, Black St. Peter, Red Malaga, Muscat, Gordo Blanco, and Muscat of Alexandria. We used the cork dust packing, and believe that well packed, well shaken cases, so that a good firm, air-proof covering is round all the grapes, and that their weight is well supported by the packing, will give a good result, provided no damaged berries are enveloped by the cork dust and the grape contents of the case proportionately small to the whole. This will mean that 5 or 6lbs. of cork dust may be required, where perhaps two are now used. But for long storage purposes and expectation of fancy prices, it may well be worth while for the grower to be liberal and not niggardly in the question of cork dust packing till something better happens along. Grapes in our State are capable of probably as much cold storage, transport, and handling as the average, and the commercial success of this year in sending quantities to Colombo, Bombay,

Calcutta, and elsewhere in the near East, is an augury for great things at no distant date; and Fremantle as the port of shipping for the mail steamers will be a splendid front door for the outlet of the surplus of fruit which must follow the fact that the wine-producing requirements of this State are, if not already, overtaken by the grape growers.

Pears.—We had a fair quantity of pears in towards the end of February, the "Williams" as usual predominating. As the season advanced, Beurré Bose, Beurré de Capiaumont, Beurré Clairgeau, Fertility, followed by Broompark, Josephine, Seckel, Winkfield, and Keiffer's Hybrid.

Most of these varieties, with of course the exception of Williams, were represented here last Christmas, and the keeping reputations of Beurré Bose, Seckel, Winter Nelis, Josephine, and Winkfield were maintained.

William pear, at all times a capricious commodity, requires a good deal more attention in the cold store than any of the others. We had eight lots from as many different localities in one room under one set of conditions, and while one lot showed deterioration at the end of February, another lot at the time of writing is in perfect condition. The grower of the rapidly ripening lot had different parts of his orchard marked, and those growing on the swamp lasted better than those growing on the rising ground. The best keepers we have had experience with are from Kelmescott, and samples of Broomepark, Josephine, and Williams forwarded to you with this report will illustrate the common experience that Williams appear under certain conditions of growth and cultivation a splendid keeper, and under other conditions, after rapidly maturing, will, in individual instances, show Brown Rot and Scald, while the surrounding pears are as sound as an apple. Specimens under observation have been known to be apparently sound one morning, and, inspected four days later under same cold storage conditions, were as rotten as could be wished. Probably the incentive to high prices in June and July, solely established by the Cold Store, will be sufficient for the orchardists to tone up their trees to carry stuff with more endurance.

The failure of one orchard crop as compared with another orchard crop under identical conditions in the Cold Store is a fact that the orchardist himself has to grapple with. Often we have been assailed for not taking proper care of a man's William pears, but immediately he went into the store and saw his lot compared with those growing under different conditions, in a locality of which he had an intimate knowledge, was one of the most convincing and unanswerable forms of logic. This prevented further waste of time and following up what they amply demonstrated to be the wrong track, and the orchardist invariably admitting that he would "try something" next season.

Cases of Winter Nelis, Seckels, Josephine, outlived all the other table varieties. We had Seckel pears fully ripe in December, and the flavour was wonderful for the length of time this fruit had been off the tree. We believe these two varieties, Seckels and Winter Nelis, as grown in Western Australia, will be a splendid subject for long storage, and it is a pity that such a small quantity of such splendidly sized table fruit is not grown to a greater extent. These pears possess individual excellence which few others grown here possess. They seem to be capable of infinitely more rough handling than the popular Williams, and their endurance indicates that for all practical purposes of storage, transport, and endurance, place them in a position high on the list



Cold Storage Fruit—Apples.

as a cold storage subject, not likely to develop rots or scald so frequently associated with the finer flavoured, aromatic varieties.

Keiffer's Hybrid and Winkfield of course, true to their traditions, will remain hard and sound for the whole of the year, and while being a very useful cooking fruit, they are not subject of much interest to the cool storage man, in so far as a cellar and barn storing of the orchardist ought to suffice for all local requirements at any time.

Apples.—The great bulk of cold storage work here, as well as in other cold stores of the State, so far as last season's fruit was concerned, was of course, apples. We had about 25 different varieties, of which the larger half remained sound till the new season's fruit came in. There is hardly any need to individualise the apples of Western Australia from a cold storage man's standpoint. Our experience, broadly speaking, is that any apple grown here under anything like favourable conditions and stored at the proper time with ordinary care, will come up to expectations so far as "keeping qualities" can express what is required. You may take the whole range of apples from King's River to Geraldton, from varieties as sound as Dunn Seedling and Rokewood to the more delicate and sweet flavoured sorts, and if we get them in anything like shape there is no doubt whatever about their paying handsomely the grower who has the patience and pluck to await till after the usual annual flood of Tasmanian fruit breaks in upon us. Last September apples changed hands here at 16s. per case, and were sold again at the middle of December at 24s. per case. The grower who had held on to them and paid storage for the longer period simply gave away his birthright, and plenty of instances could be quoted to show that speculators in fruit can always bring handsome profits to themselves by having on hand ready money when the orchardist is in need.

The best prices realised in the local market for apples *ex* Government Cold Stores were in December by some fine lots grown at Illawarra, and 25s. was reached frequently, the absolute apex of the market being 26s. 3d. for half-cases of 30lbs. each net. The Kalgoorlie market was sometimes ahead of the Perth markets, when these fancy prices were in the air. Apples supplied for last December's window dressing must have called for keen competition among fruit-growers. These articles eclipsed the prices of 1906, and were assisted probably by the short supply of stone fruit early in the season.

The season's fruit promises to bring big prices for someone. So far as we can judge, the grower has already parted with most of it to the dealer. This may be an index of expected shortages from Tasmania. However, the quantity in cold store in Tasmania at the time of writing, said to be 20,000 cases, will mean that we may expect a fair amount at the proper season. In the very near future there can be no question that the present cold storage accommodation of Western Australia will have to be added to, and no doubt the Southern growers, notwithstanding the useful work done by their cellars and barns, will observe the advantage of proper temperature, as indicated by market returns in the time of scarcity. Another point growers will gradually see the force of, is the futility and loss of attempting to barn-store their crop too soon after the hot weather. We have handled a lot of wilted fruit, which gives one the impression of an attempt being made to put windfalls in the cases. But the proportion of wilted stuff in one lot could not be explained by any other reason than that the orchardist was attempting to do what nature never meant him to do, and which his own experience and prudence will pre-

vent him from doing again after the practical lesson of loss by the one and profit by the other.

One fact, however, should not be overlooked, and that is the comparative tastelessness of the Dunn Seedling or Rokewood in June as compared with the same varieties in December. At the former period of its life the Rokewood suggests more of the turnip than the apple, while in December, after long, slow ripening, the full flavour and aroma become apparent and appreciated.

Lamb Export Notes.—The interest taken in lamb export in 1906 through the efforts of the Department to place the matter of imports before the grower, together with the increased settlement and flocks, culminated in that year's experimental shipments of a few hundreds reaching the respectable total of about 14,000 for last year. The first shipment for the season 1907 took place at the end of October, in the *Everton Grange*, and was followed by various shipments up to the end of December. As the officer deputed to examine these lambs for the Department under the Commerce Act, the various reports on their condition and get-up were forwarded to you periodically, and they were substantially corroborated by reports of the Agent General from the London end. Notwithstanding the number of experienced men who prepared the shipments for export the result was somewhat disappointing, and, considering the number of growers who entered into the business for the first time, the quantity that they were able to send long distances showed a commendable interest in the business that has done so much for the farmers all over Australia.

Unfortunately the facilities at Fremantle were not equal to the requirements of the trade, and a great number of carcasses bagged and put into the ships were not the average index of the State's best lambs. In many cases it was painfully evident that the topping off of these lambs could be easily improved upon, and in cases where a long railway journey had to be undertaken the extra care of lambs from places as far apart as Broome Hill, Koo-gan, etc., where our best samples come from, shows that there were a few men in the State prepared to take the business seriously and fulfil the requirements of the Commerce Act.

The high-grade stuff selected from the lots sent by such growers certainly were of a high average, and while they kept the Western Australian average up as a whole, it was altogether too apparent that the craze of export at any costs, as shown by the number of carcasses of a miserable weight and still more miserable appearance, was keeping the average down. The craze of shippers to send stuff to London simply because they have booked space will not hold good long in the lamb trade, and it was not entirely the lack of knowledge on the part of those who prepared the carcasses who were the cause of so much poor stuff leaving the State, but the penny-wise-pound-foolish-policy of operators who ought to have known better.

The Commerce Act not being too drastically enforced anywhere in Australia this year may be looked upon to prevent a recurrence of this sort of thing in the future, and although Great Britain may absorb large quantities of poor-class stuff, too much comment and too much disappointment follows even the partial departure from established use and custom. In the few thousands we sent away we had probably as great a range of weights, shapes, lengths, colours and conditions as probably the whole of Australasia. Better would it be that only one grade and one weight should be allowed to leave the State when a reputation is being formed, and if all the lambs of

first-grade quality between the weights of 28 and 35lbs. had solely represented Western Australia last year we would have been better off as a State.

As it was, the weights ranged from about 18 to 56 lbs., and the ages would be in keeping. While the dressing cost of a big or small carcase is similar, the bone content being proportionately against light weights, it seems a very elementary fact to live up to, when preparing such commodity for export; but it was not done, and the competition of other lamb-producing States works out greatly to our disadvantage accordingly.

Photographs herewith show some samples frozen at the beginning of August for the Northam show at the end of September. These photographs will show the grower, and anyone interested, breeding and feeding as understood in this State, and no doubt time and experience like that of last year will go a long way to perfect the matter of type.

Mr. Wilding, of Northam, informs us that these samples of Lincoln-Merino Ewe with Shropshire Ram were fed on rape for the first month, and finished off in a paddock of barley and oats. His samples were 14 to 16 weeks old.

The "milk lamb" of South Australia or Victoria is simply taken direct from the mother to the freezing works, and up to the time that they are bought and delivered every effort is made to fatten them through this natural channel.

The whole question of superiority lies in thorough topping off, by having the ewe in a good paddock the last few weeks before the lamb is sent on to the freezing depot, and then restricting the number of grades exported.

We had at least a thousand different types of lamb in the comparatively small shipments of last year. In the ordinary export works the total number of first-class grades is practically three. All outside of these, though useful and saleable, are not representatives of the best. It is hoped that the Commerce Act will rectify this matter within a few years. The lesson to be learned from the lamb export operation of 1907 may be briefly summed up as follows:—

Get earlier on to the London market, increase your quantity, and do not spare a few pounds of topping off. The prices realised, though not so large as could be desired, were certainly nothing to call for such columns of pessimism as appeared in the local press. The price for Australian lamb for the last five years has varied considerably. The lambs sold in London at the beginning of November will always hold their own with stuff that has been stored over from last season. Prices realised for South Australian lambs for November, 1906 and 1907, are identical. Prices realised about Christmas and well into January, show a considerable drop. Our best prices netted for a 34 pounder, 8s. 9½d. to the grower, is nothing to despair over. Growers must enter the fight of competition with more pluck than the commodity under observation, and not be unnecessarily alarmed at the Statistician's fine reports. *It was the export business that made the prices high in the local market, and small losses in the London market were compensated for by big prices here with what was left.*

South Australia, our nearest neighbour, after ten years developing their business, at last season's operations, range in price from a little over 11s. per carcase in November down to 4s. 10d. per carcase in February net return to the grower. This may be taken as common history throughout Australia, and until breeders and growers grasp the full meaning of what "topping off" means to the shapeliness, condition, and the number of indefinable excellences which

the trade now demands, and until they have greater quantities to select from, and a first-class depôt under Government control on the sea-board to despatch their product with the minimum of handling and mauling in first-class condition, they must not expect to have experiences different to the general run of pioneers in this business.

Further, lamb-growers in South Australia have often a large flock that would within a few days put on an extra pound or two of condition if the ewes could get sufficient grass of the proper kind, but in the absence of timely showers his whole prospect might be changed by having to sell his lambs at a lower grade than otherwise would have been the case. If the timely shower had put the finishing touch on his flock through the milk supply of the ewe, all would be well. One season must stand on its own records. Failures of one season must give place to successes of subsequent seasons. The lamb crop is not so far removed in capriciousness from the fruit crop of a State, and the market in London is consistently responsive to high-grade stuff of any commodity placed there at the proper time.

We must avail ourselves of our advantage in sending our annual crop of lamb earlier in the season.

New Zealand and the other Australian States have too much experience and vigour in pushing their lambs forward to underrate the advantage of being early in the field with new seasons products. This one point was forgotten in a great measure last year. The bulk of our lambs leaving in December simply courted comparison with the flood of New Zealand and Eastern States' stuff, and it would have been against the nature of all precedent and expectation if the fancy prices of 1906 lambs had been repeated.

The average price realised in 1907 will be a splendid bottom to start from. This record can be broken in easy stages till the pinnacle attained by our Eastern friends has been reached and passed. It would have been against the nature of all human progress if Western Australia had to reverse the order of things, and start at the top and work back as some of our learned scribes would have us believe is possible. This State must find itself in this industry as well as others.

The fruit-growers put a more cheerful dressing on their figures. It is common knowledge that since the advent of cold storage of fruit in the State Mt. Barker growers can realise over 25s. per case for ordinary fruit in the local market at one period of the year, but would not net 5s. for the same commodity landed in London at another time of the year, when the market is not favourable to the fruit.

The wheels of commerce, the growing of apples, the sawmilling of cases, would not reasonably be expected to cease the moment such dire news were cabled to the district, and so it must with the lamb. If the price is not what it ought to be, and the blame equally shared at both ends, we will probably find that some improvement to our breeding, feeding, and manufacturing will probably rectify matters, and the cost of production brought within reasonable distance of the expectations deducible from the inexorable law of averages since the business commenced in Australasia.

Samples of our export stuff shown here in Perth to a large meeting of pastoralists at Messrs. Dalgety's invitation, where the best samples of New South Wales and Victoria were compared with our own, *showed that the type here was all right*, and the London expert, Mr. Cowie, corroborated and confirmed our definitions of points to strive for in growing for the cold store.

This demonstration, the first of its kind, showing the best and worst types of each State, after three months' cold storage, would, in a great measure, give expression to the suggestion of the Agent General on this point.

GOVERNMENT ABATTOIRS.

The third annual report on Government Abattoirs began with the preparation of a set of plans in conjunction with the P.W.D. for the Eastern Goldfields Abattoirs. These were approved, tenders were called for the buildings, and accepted before Christmas. The building is now nearly complete, and the machinery and equipments are now being assembled. Some considerable delay has occurred in the oversea portion of machinery, and the abattoir will not be ready for work as soon as we expected. The delay in getting out the prices for machinery was caused by the unusual timidity shown by the local firms as well as firms on the Goldfields to quote for the work that could be made locally. The list of materials required, advertised in the usual manner, did not call any response from a representative number of those competent to do the work. The only explanation that we could get was that the list contained items that could be imported, and the importers would probably have the pick out of the list and leave local men with the unremunerative part. This was a most unexpected objection from foundry people who are never supposed to be overtaxed with work in W.A. However, after some delay the matter was got over by tenders being received from the leading firms, and the work was proceeded with without further loss of time. The Stores Manager was also able to meet us with several pieces of plant that had been in use for a very short time in the Railway Department, but their condition, after the Railways had overhauled them, was practically as good as new, and a substantial saving to the Department was the result, and the money spent kept inside the State.

The writer spent some time in Kalgoorlie and Boulder at the end of November, preparing a report for the Hon. the Minister on the Meat Supply. The whole question of transport by rail and its consequent hardships to cattle in the summer time was fully investigated. Extended visits were made to the various abattoirs and distributing centres, and every officer in the various capacities was conferred with. We found that the only cure for the whole trouble was what had been already provided for by the Government in establishing one Central Abattoir. The penalties laid down for illicit slaughter of animals for food are very severe, in fact it is questionable if ever the full penalty has been inflicted. Perhaps home moderate punishments frequently inflicted for breaches of the present Health Act would have a beneficial effect in checking the possibilities of an occasionally diseased or emaciated animal that is too frail to walk to the Abattoir, or whose owner is ashamed to be seen standing by his own stock, but who would not hesitate, once the animal was slaughtered, to vend to the second grade retailer or cutting cart, for the general use of innocent people, and might be more efficacious in holding this evil in check. The meat supplied to the Goldfields by established firms of repute doing business there is as good as any, but the extent of the district lends itself to occasional evasion of the law, by certain individuals who may be expected to be found in a small proportion preying on the legitimate trader, where a scattered community, like that of the Goldfields, is to be met.

The Goldfields local authorities, I understand, are dealing with this matter, as well as the question of having a central point on the Goldfields where all

meat killed by farmers and others outside their boundaries will come into and be inspected before being allowed to be offered for sale.

The writer, during his visit to Adelaide and Melbourne, exchanged notes with the abattoir people of these places, and found that the abattoir at Flennington was a very popular, successfully managed, and highly spoken of institution.

The City Accountant told the writer that bad debts were practically unknown, and that the great boon of this popular institution was appreciated by all, and esteemed indispensable by the master butchers of Melbourne, in dealing with the enormous amount of meat needed by a large community, and further additions were contemplated, whereby a still larger number of stock could be treated for the local or other markets.

The Adelaide people were in the midst of a change from the old order of things to the new, and the 41 private abattoirs, which contributed each their little quota of nuisance, will in the near future be reduced to one central system.

The experienced Melbourne officers who were in touch with the movement of public abattoirs for a long time, informed me that considerable friction is often to be expected at the beginning of a thing like this, but eventually the master butchers get into step with the system, they see the economy, precision, certainty, and uniformity of the work performed.

The Goldfields Abattoirs at present under construction, through the peculiar surroundings of Kalgoorlie and Boulder, will necessarily deal more comprehensively with the nuisance of killing than any of the abattoirs in the East, where drainage and considerable manufacturing of the by-products of slaughter are contiguous and ample.

We will in Kalgoorlie have to provide for the holding of hides under the "Act" as well as the destruction of all condemned and objectionable animal products.

We will also have a small cultivated area, and sewage, after being precipitated, will be utilised for growing green stuff. No blood nor offal will be allowed to leave the premises for any purpose other than human consumption, as in the case of dressed tripe, sausage casings, etc., but it will be manufactured and sold to defray its cost of manufacture.

This is the practice established in Melbourne and elsewhere, but the drawback to the above place, in not having full equipment of plant, a great deal of the work has to be done outside. The same applies to Sydney. We intend to provide for both these functions, and, if need be, the destruction and sterilising of all butchers' shop scraps that are often a nuisance in a closely built neighbourhood, and are generally sold to the boiling-down establishments at a nominal figure.

We will be able to treat this stuff as cheaply as anyone, and will save a considerable amount of cartage, whilst conserving the public health.

The Crown Law authorities are at present overhauling legislation, regulations and by-laws necessary for the complete guidance, working, and order of the scheme. They will be doubtless presented to you this month, and will show the scope of our work, and the area controlled by the Eastern Goldfields Abattoirs.

The question of vesting these institutions under the control of local authorities, which is now engaging the Minister's attention, will mean that after providing for running expenses and a small charge for sinking fund, and the

fees charged for paddocking and slaughtering of animals, will be adjusted to suit the people who are charged with the responsibility of a public abattoir for their own special use.

Public abattoirs are essentially a municipal function, and the present movement for the Government to build and instal those institutions in the various parts of the State will ultimately bring Western Australia up to date in a matter which is of vital importance to health, and should be made utilisable, if need be, for the export trade of the State.

The Commerce Act, when in full working order, and the standard laid down by them fully appreciated, will require a much simpler system in carrying out these requirements than that which was in operation last year during the export lamb season.

In the matter of lambs killed at the many abattoirs now at Fremantle, a stock certificate as to their health and the meat inspector's certificate as to their fitness for human consumption will not suffice if the lamb in question is to be put up to the standard demanded by the cold storage business. It was amply demonstrated that carcasses conforming with the requirements of these departments were unmistakeably unfit for export business if the reputation of the State was to be considered. Moreover, the cost of so many different officers and the complexity of their opinions has a tendency to undermine anything like a solid grip of the business. A proper Government abattoir and export dépôt, where local and over-sea requirements are dealt with by one Central Authority, would remove all these doubts and heartburnings through so many different definitions of what is right, and conserve the State's reputation. The American Bureau of Animal Industry have just issued revised regulations where the *anti* and *post mortem* examinations are made under one central authority, and the meat for export and local consumption is all guaranteed by representatives of the Department of Agriculture, and the full responsibility is taken by the officer of that Department. The standard of the country is to be rigorously enforced through this medium in the United States, and it is in this manner that New Zealand has gained and maintained her supremacy in mutton to a great extent.

Revised meat inspection and revised preparations for shipping are now being considered at Sydney and Melbourne and Adelaide. The public abattoirs at Sydney and Melbourne are preparing to deal with the export business, and the abattoir and export dépôt at Adelaide will be capable of doing the whole of the work of the State at any time without seriously dislocating the export requirements. There is, therefore, every inducement for us in Western Australia to improve from the beginning in construction, in administration, and in result.

PERTH MARKETS.

The report on the City Markets for the year is as follows:—The business with the wholesale firms in meat and fish has been slightly above the average. This section has been kept busy the whole of the year, and we have little to complain about, so far as vacant stalls are concerned. The retail end is still more or less a partial success only. To encourage prospective tenants, the rents were reduced considerably last year, but owing to the counter attractions in more central channels of traffic, the business here was

not as bright as we would like to see it. Keen competition among the various distributing auction rooms for produce, and the energetic canvassing of these houses among the small growers has in a great measure prevented our markets from being availed of to any great extent among small growers. Market gardening is not a prominent feature within 10 or 20 miles radius of Perth, and the success achieved by the Central Markets of Melbourne and Sydney, whereby thousands of small holders are attracted with their own teams and waggons to make a weekly journey through to the local market, where they dispose of their stuff to the consumer direct, after paying a small fee for a temporary stand within the market area, does not seem to be a movement that will take on largely in Perth for some time to come. The large proportion of suburban dwellers, together with the increasing army of hawkers, work against the housewives making the morning pilgrimage to the market in any numbers. Tram fares, too, are a heavy handicap to the housewife dealing with the grower should he ever be induced to come into Perth.

Compared with the Queen Victoria Markets, Melbourne, where a couple of thousand of market gardeners' carts and poultry men may be seen any market morning, we are far behind in utilising the method of quick cash returns to the grower, and fresh clean produce that has not been handled and mauled about to the consumer.

Photographs herewith give an idea of the extent of the markets run by corporation of Melbourne. This Victoria Market is one of the finest markets in the world, and has been gradually extended till the 15 acres now within the jurisdiction of the Markets Manager, in this particular market, is taxed beyond its limits.

Photograph No. 1 gives an idea of the variety of supply. Photographs Nos. 2 and 3 give an idea of the demand. The products there range from bananas and pineapples from the northern peninsula of Queensland to Stewart Island oysters and blue cod gathered from the extremities of the southern portions of New Zealand.

Of course this large volume of business creates more business, and some effort should be considered by our Department to popularise and get the small grower to send his stuff here, even though the available area for market stuff may be somewhat more remote from Perth than is the case in Melbourne. That there is a future for marketing in Perth goes without saying when the advantages of public markets are patent to the more enlightened municipalities. We were successful this year in making a small beginning in municipal markets, after considerable negotiations, and the fish supply of Perth is now under municipal control, and centered inside of our building.

Although the City Council made exceedingly good terms, it will mean that from this on the fish business can gradually be controlled within the limits of the law, and the fact of all fish being under the official eye will tend to improve the quality, and, it is hoped, increase the quantity.

The work of these markets will not be immediately apparent to the superficial observer. It will in a great measure prevent under-weight and unwholesome fish from ever being seen, not to mention eaten by the consumer, so far as it is possible for any controlling body to prevent such things.

The market was opened on the 21st May last, and has successfully taken hold of the business. By gradual extension of such measures we may be able to restore the markets to the original intentions of its promoters, and



while the revenue derived from this institution is sufficient to cover working expenses and allow for interest and depreciation, we are satisfied that the market and cold store running together economise the working expenses of both, without impairing the utilities of either.

A. D. CAIRNS,
Manager.

ANNUAL REPORT OF THE CHIEF ORCHARD INSPECTOR.

The Under Secretary for Agriculture.

I have the honour to submit my annual report for the year ending 30th June, 1908.

Last year there were 12,517 acres under orchards, and 3,525 acres under vines. This year the returns are not yet available, but no doubt there are, approximately, 14,000 acres under orchards, while I estimate the vines will be about the same as last year. From what I can gather, extensive planting of orchards is going on this winter. The number of inspectors, viz., six, is the same as it was many years ago, and, therefore, if I am to keep level with the inspection work, it is necessary that one or more new inspectors should be appointed.

There is no doubt that there is a great future in store for the fruit industry of this State, provided it is worked on good commercial lines, and judiciously guarded against natural enemies. Our fruit has already a first-class name on the London and Continental markets. The recent returns of 7s. 6¼d. clear profit for well-packed apples, is excellent.

The inspectors are doing excellent work, and in addition to enforcing clean orchards, they instruct the growers how to prune, bud, and graft their trees, how, where and what to plant, how to drain and cultivate, and generally form a medium for the dissemination of much useful knowledge.

The following is a brief report on the principal pests of the State:—

Fruit Fly.

I am pleased to state that this year there has been a most remarkable reduction in the quantity of fruit destroyed by this fly, and probably the following returns of fruit seized at auction rooms and shops will give a fair indication of the difference. Last year 1,287 cases were seized and destroyed, principally for fruit fly, while this year only 284 cases have been destroyed.

The two main factors in this reduction, without doubt, were a cool summer and the use of kerosene. The use of kerosene for the destruction of fruit flies was a most valuable discovery, and by it many thousands of flies have been killed this year. There is also every indication that the parasites introduced by Mr. Compere will prove a great success, so that we may now confidently look forward to the time when this serious pest will be of little account.

Codlin Moth.

Last January this pest was discovered by Inspector Hutcheson in some old gardens in St. George's Terrace, Perth; it was promptly dealt with, and I have every hope, eradicated. A keen watch will be kept next Spring on this neighbourhood. The other parts of Perth, where the three previous outbreaks had occurred, showed no signs of the moth this year, and at Albany, where an outbreak occurred five years ago, there has been no sign of this pest for the last three years. I suppose we shall always have these occasional cases as long as there are people who will smuggle in a few apples and pears regardless of the harm they may do to this State.

San Jose Scale.

Last winter was so very wet that I fully expected a slight increase in the number of trees infested with this scale. This year the return to hand shows about 9,713 trees with this scale, an increase of 5,200 trees over last year.

Most of this increase, about 4,800, is from the Darling Rauges, which have now been more thoroughly inspected. With the exception of this district, the trees are very little infested, it being hard in most cases to find it.

Lecanium Cymbiforme Scale.

This scale has, with a few exceptions, been confined to the Metropolitan area. In the few cases outside of it, it has been either reduced or eradicated.

APPLE MUSSEL SCALE.

Mytilaspis Pomorum.

This scale has made its appearance in this State in 16 orchards; of these four are now clean, and the remainder have only a total of 82 infested trees as against 240 infested last year.

Woolly Aphis.

This pest bids fair to be the worst in the State owing to the ladybirds and other natural enemies not being strong enough to cope with it. Therefore spraying two or three times a year has been necessary to save the trees or their fruit spurs from destruction.

Snails.

The English snail has been found in two gardens in Perth, and one in Fremantle. Steps are being taken to destroy them, and I expect eventually they will be eradicated.

Pear and Cherry Slug.

This pest was found last year in 13 orchards in this State. This year it has been found in eight of these orchards, and in the remaining five it could not be discovered. The damage done was of no account, as the pest was dealt with immediately it made its appearance.

CURCULIO BEETLE.

(Otiorhynchus Cribricollis.)

This beetle has caused much damage in the Nelson district by ringbarking the fruit spurs and shoots of the trees. Poison seems to have very little

effect on them, and the best means of destruction so far, has been to place a light iron tray under the trees, then shake the tree and sweep the beetles from the trays into a tin of kerosene, or into a fire.

Potato Moth.

This moth still causes a great deal of loss, but may be kept in check by spraying with Paris Green, which if started early enough, will save the crops attacked. I am now experimenting with phenyle on potatoes containing the maggots of this moth, and will report the result later.

Fungoid Diseases.

It is becoming more and more apparent that these diseases work an enormous amount of damage. The number of varieties probably run into thousands. The services of a qualified pathologist are badly needed in the Department, and meanwhile we are indebted to Mr. McAlpine, of Victoria, and others, for their kind assistance, and are doing all we can to check the introduction and spread of fungi.

Puff Balls.

During the last year many complaints have been received of the damage done by this fungus (*Armillaria mellea*). A condition favourable to this disease is the unsatisfactory clearing the land by just grubbing out the green timber and leaving the roots full of sap to rot in the soil. These make regular nursery beds for the fungus, whose mycelial threads radiate from these centres and attack the roots of practically all varieties of fruit trees. Also flat, badly drained, sour land predisposes the trees planted on such land to the disease.

The lessons therefore so far learned are to ring-bark the native timbers so as to let the sap dry out of the roots, then carefully grub the trees, taking care to remove all the roots possible, drain the land, and cultivate for a year or two, to sweeten it before planting fruit trees.

T. HOOPER,

Chief Inspector of Orchards.

29th July, 1908.

ANNUAL REPORT OF THE CHIEF INSPECTOR OF RABBITS FOR YEAR ENDING 30TH JUNE, 1908.

The total length of Government rabbit-proof fence erected is 2,023 miles, and about 10 miles are in course of erection.

The No. 1, or Barrier Fence, starts at Starvation Boat Harbour, in the Great Australian Bight, about 70 miles West of Esperance, and runs for 1,139 miles in a Northerly direction to the Ninety-Mile Beach on the Indian Ocean, which it joins about 25 miles North of Condon.

The No. 2 Fence starts at Point Ann about 60 miles West of Starvation Boat Harbour and runs slightly West of North to Yalgoo, then it turns and runs a little North of East until it joins the No. 1 Fence at Gum Creek, a total length of 724 miles.

The No. 3 Fence starts from a point on the No. 2 Fence about 25 miles West of North from Yalgoo and runs almost due West until it joins the

Indian Ocean at Bluff Point, about 20 miles South of the mouth of the Murchison River.

The approximate cost of the three fences for construction and water supply along them is £350,000.

The land for fifty links on either side of the fences is reserved, and on the East and North sides is grubbed and cleared for a distance of 12 feet from the fence, and it is along this clearing that the Inspectors and Boundary Riders travel. On the West and South sides the clearing is eight feet in width as a protection against fire and that traces of rabbits might easily be seen.

In the Nos. 1 and 2 fences the posts are 12 feet apart with a barb wire running 3 feet 10 inches from the ground, below this three plain wires are run to fasten the wire netting to, at 4 inches, 20 inches, and 36 inches above the ground. The netting is 42 inches wide, $1\frac{1}{4}$ in. mesh, and $17\frac{1}{2}$ gauge, and the portion that goes into the ground and about six inches above is coated with a mixture of tar and kerosene. In firm country the netting is buried for six inches vertically in the ground, and in sand 12 inches below, and ought to have a height of 36 inches above, but it was found in practice that it was not always possible to get this height, so 2 feet 10 inches was fixed as a minimum. The wire netting is attached to the three plain wires at four places on each between each pair of posts. The No. 3 Fence is slightly different, only two plain wires being used, and the posts 18 feet apart. This was a cheaper fence to erect, and seems to act as well as the more expensive one.

As nearly all the fences run through very dry country, a water supply had to be provided for the use of the men who had charge of the maintenance of the fence. This has been done by bores, wells, tanks, and rain sheds at distances averaging about 20 miles apart.

During the past year I inspected about 1,100 miles on the three fences, and found them well maintained and in good order, with the exception of where salmon gum and blackoak timber had been used for posts. Many of the salmon gum posts have been destroyed by white ants, while the blackoak posts have been utterly destroyed, so that in all about 50 miles of posts will have to be renewed this year. Jam or pine posts, as most convenient, will be used, as these well resist the termites.

The principal dangers to which the fences are subjected are floods, fire, and wandering stock, such as camels and cattle. In places, notwithstanding all precautions, the three fences suffered very severely last year from floods, and cost about £15,000 for repairs. This loss would have been much greater had not extra men been employed and stationed on the dangerous areas. Miles of fencing were washed down, but it was rapidly temporarily repaired so as to make it rabbit-proof, and later on permanently secured. Great credit is due to the inspectors and men for their efforts in seeing that all damage was promptly attended to and made rabbit-proof under most severe climatic conditions.

Fires on the No. 2 Fence were responsible for considerable damage, amounting to about £500. These fires were generally caused through settlers burning off, and not taking proper precautions to prevent the fires spreading.

Wandering camels and station cattle are also responsible for considerable damage through breaking down the fences, while on cattle stations damage is done by the cattle walking up and down the fence, especially in wet weather, and making deep ruts that are sometimes below the level of the wire netting,

that is six inches below the ground. These ruts have to be filled up, and as labour in the back blocks is scarce and expensive, this adds considerably to the expense.

Another source of danger and expense is the illicit traffic along the cleared portion of the reserve on the fence. There has been considerable traffic of wagons, drays, and agricultural machinery, and very serious damage has been done to the fence through the vehicles running into it, breaking down the posts and tearing the netting. Besides the mere damage done, there has been the danger of rabbits getting through, for so far as I can learn, in no case have the persons who were responsible for the damage attempted to repair it, even in a temporary manner, so as to keep rabbits out.

Another trouble from this traffic is that the track along the fence is so cut up with ruts that it is almost impossible for the boundary riders to ride bicycles on it and keep an eye on the fence, and if continued it will mean that two or three men will have to do the same work that one man does at present.

Owing to this traffic I have had to put two extra men on the Cunderdin section, which with wages and outfit is costing at the rate of £400 per annum more than it should at the present time.

Owing to this traffic our water supplies suffer greatly, and water has to be carted great distances, as trespassers use for themselves and stock the water conserved for our own officers, and as most of the work is done on bicycles a man cannot carry much of a supply for hot weather.

A rain shed supply, consisting of two four hundred gallon tanks, and depending on the rain, is sufficient for our own men, but when teams of horses and camels are watered from them our supplies run out, and it is impossible to have the fence looked after as it should be, when a man, in summer, may have to travel 80 or 90 miles with only such water as he can carry on a bicycle.

Numerous police proceedings have been taken against trespassers, but the sympathy of the magistrates seems to be with the trespassers, as such fines as 1s., 2s., 5s., and 10s. would indicate.

I would like to state that many of the squatters assist us materially, as in the case of fires and floods they often have the fence temporarily repaired by their own men immediately after the accident has occurred, and before our own men are able to get on the spot, and unless they have to employ extra men for the purpose it is seldom they make any charge to the Department, although we are always willing to pay for the time put in in making the fence secure when an accident occurs.

Expenditure.—The actual maintenance expenses this year are considerably less than those of the previous year, amounting to £4 16s. per mile, as against £6 per mile the year before; as the fence gets in better order and many of the places where flood gates exist are stoned and the banks protected, the maintenance should still further decrease in cost. But while the cost of maintenance has been reduced there has been a heavy expenditure in other ways, some of which should not occur again, while from such dangers as fire and floods there is always a possible recurrence from these; some years we are very free, but last year the expenses were very heavy.

There was also a heavy expense incurred in bringing up a large portion of the fence we took over to the standard of efficiency. This will, I hope, be completed during the coming year, and will not appear thereafter. There was

also an expenditure of over £1,000 which was not counted on for plant and stock handed over to us by the Public Works Department; this will not be required again.

Rabbit destruction was accountable for an expenditure of £409. This was caused through rabbits having made their appearance in several places inside the No. 2 Fence, and men had to be put on to try and eradicate them, and, with one exception, were successful.

Another expense not likely to recur is the fencing in of a camel paddock. This was necessary, as we have a fine lot of young camels from one year to three years old, and they were getting scattered all over the country. They and a few broken-down cow camels are being sent to the paddock, and we will not only be able to keep ourselves in camels, but have some for sale.

The fodder account was unusually high, and this was accounted for by the high price of chaff.

Rabbits.—During the past two years rabbits have been reported inside the No. 2 Fence at Mullewa, Coorow, and 45 miles north of Cunderdin, also at Lynton.

At Mullewa there seemed to be a considerable colony of rabbits, and several times it was thought they had been exterminated, but later on fresh traces were found. These places have been regularly inspected, and no fresh traces of rabbits have been seen for the past six months.

Out east from Coorow, rabbits were reported about two years ago, and immediate steps were taken to destroy them, and it is believed successfully, as since then I have had the place inspected five or six times and no traces can be found.

Rabbits were also reported 45 miles north of Cunderdin, and these seem to have been eradicated also.

Rabbits were reported at Lynton about 30 miles north-west of Northampton, and on investigation it was found that they were along the coast to the No. 3 Fence and for another 40 miles north of that again. It was also ascertained that rabbits have been known to be in the Lynton District for over 20 years past, having on various occasions been brought from the Islands and turned out.

The dealing with them here is one of great difficulty, as the country is so heavily covered with scrub that it is almost impossible to walk through it, and there seems to be but little chance of their ever being eradicated.

Unless some precautions are used, such as another fence, or the land cut up into small holdings and cleared, these rabbits will ever be a menace to the other agricultural districts. Fortunately, they seem to be kept considerably in check by the wild domestic cats which abound through all the district.

Between Nos. 1 and 2 Fences rabbits are scattered in small numbers almost all over it. In some places, such as the North-East portion, they are fairly numerous.

On the whole but little action has been taken by the owners and occupiers of the properties, unless compelled to by the officers of the Department, and as the area affected is so large, it was found necessary to keep two inspectors constantly at work, making the settlers destroy the rabbits on their holdings.

Outside the Barrier, or No. 1 Fence, several waves of rabbits have struck the fence during the past year, and, as usual, turned North. The first lot were very numerous, and cleared the country for about two miles East of the fence from everything edible, and thousands died when they reached the spinifex

country. Other waves followed, but most of them died from starvation, and in many places the track along the fence is practically paved with rabbit bones.

Advances to Settlers of Wire Netting.—Wire netting has been advanced to settlers on terms, at cost price, extending up to 20 years, at four per cent., one-fortieth of the amount having to be paid off each six months.

This advance has been largely taken advantage of by the settlers to the East of the Barrier Fence, between Esperance and Eucla, and to a much lesser extent by settlers between the Barrier and No. 2 Fences.

The concession is not available for settlers to the West of the No. 2 Fence, as such expensive fencing is not required, there being no danger at present from rabbits.

Wire netting to the value of £10,000 has been distributed by the Department, and there are inquiries for a considerable amount more.

Summary.—The large area of land between the two fences has rabbits practically all over it, and we must not expect to ever see them eradicated, but as the Barrier Fence keeps their numbers from being reinforced from the East, with watchfulness and continued care and attention to the destruction of them by the settlers, they need never get to be a serious pest, but for such to be the case, every settler must be prepared to take his full share of the work, if not willingly, then he must be kept up to it.

The agricultural districts are free, but the rabbits at Lynton are a standing danger to them.

The pastoral districts in the North and near the Barrier Fence have a few rabbits in places, but so far as the reports from my inspectors and others, show they do not seem to be increasing, and in many places there are fewer rabbits now than there were a few years ago.

Dingoes, cats, hawks, and iguanas are responsible for the destruction of large numbers of rabbits, especially dingoes who catch them by the dozen on the outside of the Barrier Fence. Iguanas should be protected, as in the breeding season they destroy a great number of young ones; I saw six young ones taken out of one iguana.

ALEX. CRAWFORD,

Acting Chief Inspector of Rabbits.

21st September, 1908.

ANNUAL REPORT OF "JOURNAL" and LIBRARY.

To the Under Secretary—

Sir,—

I have the honour to submit the following brief report on the state of the *Journal* and Library of the Department, of which I took charge in the early part of March last. As soon as I gained an insight into the position of both branches, I acquainted you with the facts and received your instructions to effect reductions in the cost and distribution of the first, and reorganise the second.

The number of copies of the *Journal* struck off each month being found much in excess of requirements, a considerable reduction in the issue was at once made, with the result that the cost of production was reduced from 10s. per page to an average of 6s. 6d. per page. This effects a direct saving of about £250 per annum. It is possible to make further economies on the lines I have previously suggested.

The subscribers' list has steadily increased by about sixty on the number in March. A considerable falling off in advertisements had taken place, but I am glad to note that there is now a decided improvement in that direction. The Department loss on the *Journal* up to June 30th represented a sum of £392 6s. 11d.; but with the changes referred to, this has since been lowered by more than 50 per cent.

Increasing settlement on the land has created a much wider interest in the *Journal* among the class we chiefly desire to reach, causing an increase in the general circulation and a greater demand for the *Bulletins* issued by the Department.

An inventory of the Library has been completed, the books re-catalogued and re-numbered, and re-arranged on the shelves according to classification. The total number of works in the cases and catalogued is 1,251, to which several new ones have been added since. The growth of the Library has overtaken our space capacity, making provision for more cases necessary for the reception of further additions, from time to time, of latest editions of works on agricultural subjects.

Bulletins, reports, and other publications which are received in large numbers from all parts of the world, have been classed in order and placed in the Library cupboards. Journals and newspapers from other States and countries, accessible to the public, have been fairly well patronised by visitors daily.

I have, etc.,

H. ALLERTON COWPER,

Sub-editor.

12th November, 1908.

ANNUAL REPORT OF THE ASSISTANT ENTOMOLOGIST.

The Under Secretary for Agriculture.

Sir,—

I beg to submit my annual report for the year ending June 30th, 1908.

During the year ending 1907-8, the work of insect parasites has been confined principally to the breeding and distribution of the fruit fly parasites, which were introduced by Mr. Compere in December last. The first batch of insects bred out were liberated in the middle of January. Up to the present, about 500 colonies—or say 150,000 insects—have been distributed. This does not include a quantity of parasitised pupæ sent to South Africa and estimated to yield, roughly, 20,000 insects.

The parasites have been sent to many parts of the State, but more particularly to the Swan District, where we are making a special effort to establish them.

It has been stated that these parasites breed well in the breeding cage, but would not show the same results when placed in the orchards. This has been proved to be contrary to our experience, as some of our officers have obtained parasitised pupæ from orchards where the parasites had been liberated, producing as many parasites as those obtained under artificial conditions.

It will, therefore, be seen that if these beneficial insects become established, they will prove a heavy check on the ravages of the fruit fly.

It is as yet too early to make any definite statement as to their possibilities.

For the fullest benefits to be derived from parasites, it is essential that every orchardist should co-operate with the Department in the breeding of the parasites, and all particulars in this connection will be gladly given to those who desire to take an interest in the matter.

Of course, it must be understood that the parasites will not entirely eradicate the pest, which would mean the extinction of the parasite itself, but what is claimed is that they will reduce the pest below the danger line.

The success obtained by the various scale parasites lead us to believe that the efficacy of the parasite theory is beyond doubt. This is the experience of this State, and can be verified by the inspection of many of our orchards.

Many colonies of scale parasites have been liberated during the year, and the results obtained have been fully appreciated by the growers, as the many letters we receive will show.

The cabbage aphis parasites have also done excellent work in all parts of the State. The latest addition received from Ceylon has been found to be worth more than all the previous parasites used for this pest.

Many beneficial ladybirds have been received from time to time and liberated to attack various orchard pests, and can be found doing good work.

It is not claimed for the ladybird—which is purely predatory—what is claimed for the internal parasites, predatory insects being, as a rule, much larger and more easily destroyed by birds, etc., than the internal parasite.

Mr. Compere is now searching for parasites of the Woolly Aphis, Cabbage Moth, Potato Moth, and Red Scale, in conjunction with others for the State of California. Mr. Compere has just arrived at California with a large consignment of beneficial insects for that State, and by reports to hand, his work has given satisfaction.

Most of the orchard pests of this State are not indigenous, but were introduced from other countries, without their native parasites, and an insect under these conditions, rapidly assumes the form of a pest, which necessitates, to create the balance of Nature, the introduction of its animal enemies.

The greatest trouble met with is to get the people to understand that the parasites must be given time to establish themselves, and should not look for results immediately the insects have been liberated. Every orchardist should assist the spread of parasites, by breeding them for themselves. It has been very difficult to keep the fruit fly parasites going during the months of May and June, as the fruit fly was very scarce. This difficulty has been overcome by breeding the fly artificially in the hot house, into the bitter orange, this being the only fruit they could be enticed to lay into. Since discovering this,

there has been no difficulty to obtain maggots, and we will be able to keep the parasites going all the winter, and be ready with an early supply next summer.

A number of parasitised pupæ were placed in cool storage for two months at about 40 degrees, but on taking them out it was discovered that the blue mould (*penicillium Sp.*) had destroyed the lot. Another lot were placed in cold storage, and fared slightly better. Eventually it was decided to keep on re-producing them, and to put no more in cool storage, as there was an abundance of larvæ available.

Last summer the fruit fly was very much less in evidence than the previous summer. This was due to several causes:—

1. The failure of the stone fruit crop.
2. The cool summer.
3. The large number of parasites distributed.
4. The more careful cleaning up of infested fruits.
6. The general use of the kerosene traps.

During the year, the following colonies were liberated:—

		60 Colonies of Black Scale Parasites
62	..	Red Scale Parasites.
62	..	Brown Scale Parasites.
121	..	Cabbage Aphis Parasites.
12	..	Ladybirds Parasites.
4	..	Cabbage Moths Parasites.

In all, a total of 321 colonies.

To this must be added 500 colonies of fruit fly parasites, making a total of 821 colonies liberated during the year, with very beneficial results.

The following were received during the same period from Mr. Compere:—

2	Consignments of Soft B. Scale Parasites.
1	.. Cabbage Aphis Parasites.
3	.. Cabbage Moth Parasites.
1	.. Fruit Fly Parasites.
2	.. Ladybirds Parasites.

Total nine consignments.

These consignments include several species, and as they were only liberated last summer, it is too soon to state how many of them have established.

Black Scale (Lecanium oleae).—Once the most serious pest of the orchards and gardens, now only spasmodically reported, when parasites are forwarded, and quickly subdue the outbreak.

Brown Scale (Lecanium hesperidum).—This scale is now one of the most troublesome pests of the citrus trees. The smut which follows makes both the tree and fruit very dirty. The ants are also very much attracted, swarming over the infected trees in countless numbers, and thereby greatly hindering the work of the parasites. There are so far, only four internal parasites on this scale, which are doing very excellent work. We are hoping for further parasites from Mr. Compere on this pest. To get successful results from parasites, the ants must be got rid of.

Red Scale (Aspidiotus aurantii).—A very serious pest of the citrus and other plants. Two species of internal parasites besides ladybirds are doing good work on this scale. Many excellent reports have come in concerning the efficacy of parasites supplied.

San Jose Scale (*Aspidiotus perniciosus*).—This seems to be on the increase, and if it continues, would recommend the introduction of parasites.

Vine Scale (*Lecanium cymbiforme*).—This is gradually spreading, being reported on vines, figs, apricots, peaches, mulberries, plums, and in one instance on lemons. This scale needs treating seriously, as there are no known internal parasites attacking it. The parasites introduced on this scale were not true, being internal parasites of the Soft Brown Scale, and have turned their attention to the same.

Couch Grass Scale (*Odonaspis jancirensis*).—This is still spreading, destroying the lawns wherever it obtains a hold. The results are so gradual on the grass, that the average person does not discover it, until the grass begins to go off. Several experiments have been made with chemical manures, tobacco wash, and Quassia Chips, but with temporary results. The scale has been found on the roots to a depth of 15 inches. This makes it very hard to treat. The surrounding grass being affected, it is only a matter of time before the lawn is again attacked. Several people have replaced the Couch lawn with Kentucky Blue Grass, with success.

Pear and Cherry Slug (*Selandria cerasi*).—This has again made its appearance, and every effort should be made to eradicate it. To accomplish this, the second brood is the one to watch, as they are the ones that enter the earth and produce next Spring's brood.

Bud and Bark Nibbling Weevils.—Several of the native species are showing signs every year of becoming more troublesome, having developed a taste for other foods than their native. This is probably due to the clearing of the native vegetation. An instance of this is the Root Borer of Victoria (*Leptops Hopei*) which has become one of the most serious pests of the Apple and Pear industry.

Woolly Aphis (*Schizoneura lanigera*).—This is still strongly in evidence, and gradually extending its area. So far no internal parasites of this pest have been discovered. Several species of ladybirds do good work on it, but without the aid of internal parasites, they are not sufficient to keep it in check.

Orange Aphis (*Siphonophora Sp.*)—This has increased in the last year or so, and bids fair to become a serious pest in the spring, attacking the young shoots and buds of trees, causing the blossom and fruit to fall. It is only very slightly parasitised by an internal parasite and often appears too early for ladybirds.

Cabbage Aphis (*Aphis brassicae*).—This appears at different times during the year, but it is no longer looked upon with any fear, as the parasites completely hold it in check. The large numbers of letters received bear out this fact. During the year a new species of internal parasite was received from India, and has become thoroughly established.

Diamond Black Cabbage Moth (*Plutella cruciferum*).—This is still a serious pest of cabbage and turnip. From the evidence of the growers it is ten times easier to grow cabbages now than it was some years ago. This is due to the very excellent work of the introduced parasites, and their activity seems to be increasing every year. The parasite introduced from India has become established and will be distributed during the coming year.

Potato Moth (*Lita solanella*).—This continues to cause a great amount of damage, and so far no parasites have been found attacking it. Good results have been obtained from spraying the foliage with Swift's Arsenate of Lead.

Mole Crickets (*Cryllotalpa borealis*).—Several reports have come to hand

concerning the serious damage being done to potato crops by this underground pest. There appears to be no really good method of treating this insect.

Tomato Worm (Heliothis armigera).—This was very serious in the early part of the season, attacking many kinds of fruit and plants. There are several species of Ichneumon parasites which attack this insect, also a predaceous bug.

General Remarks.—During the year the Entomologist of the Department, Mr. George Compere, was only with us for about three months, being absent in foreign countries in search of parasites. During this period he forwarded to this State a new species of Chalcid Fly parasite on cabbage aphids from India, which has become established. Two new species of internal parasite on Soft Brown Scale, with what results is not yet known. Three lots of Cabbage Moth parasites, one species established. Ten species of Fruit Fly parasites, three of which have become established; the benefit of these will be proved this coming summer. Seven species of Ladybirds, Aphids, and Scale Feeders, liberated in the gardens around Perth and the Goldfields. Two species of Thaliypochares Moths from India. Two species of Red Scale internal parasites, which failed to breed out.

On the whole, the sending of parasites during the past year has been more successful than in previous years.

The establishment and success of the Cabbage Aphid and Moth parasites, also the Fruit Fly parasites, cannot be estimated.

The absence of the Entomologist has resulted in the bulk of the work falling to my lot. Large numbers of insects, fungus disease, poison plants, and grasses have been forwarded for identification. A large amount of correspondence and interviews dealing with horticulture and entomology has been dealt with.

Inspectors Bailey and Pollard, who have assisted in this branch, have worked all hours and days, showing great interest and adaptation to their work, and I desire to place on record my appreciation of their services.

The enlargement of the office and extra breeding room have greatly facilitated the work, and we are looking forward to a very successful year.

The work, as a whole, during the year, has been very satisfactory, and where the parasites have been established the results have been an unqualified success.

I have, etc.,

L. J. NEWMAN,

Assistant Entomologist.

June 30th, 1908.

ANNUAL REPORT OF THE POULTRY EXPERT.

The Under Secretary for Agriculture.

In accordance with your request I have the honour of submitting my report for the past twelve months.

It is satisfactory to note that importations of eggs are steadily decreasing at the rate of about £5,000 worth per year; still we have a lot to make up, from the fact that our egg importations for the year 1907 amounted to the large sum of £62,448; in addition to which there is a sum of £3,968 for frozen poultry, and £266 for live birds, making a total of £66,682 for products.

We have natural conditions eminently adapted in every respect for successful poultry raising, equal to, if not surpassing, any of the Eastern States, and to many persons it seems strange that we are so backward in this respect; but it must be remembered that we are also very small producers in other lines of dairy produce, viz., bacon and butter, and I think our progress in the matter of egg production will expand in proportion as the two above-mentioned lines also extend. I am, however, of opinion that the egg industry could be quickly advanced under the stimulating influence of a system of Farm Competitions, which I referred to in my last annual report. A sum ranging from £500 to £1,000 would be required for the same, and I feel confident that were such a system adopted it would be the means of inducing many more persons to engage in poultry for profit, and thus quickly reduce the egg importations.

Our ordinary mixed farmer in the country still continues to evince little interest in poultry matters, but it is pleasing to note that within the metropolitan areas, notably with landowners in such localities as Cannington, Gosnells, Belmont, Jandakot, and Coogee, there has been a very marked increase in egg production. Some men are entirely poultry farmers, others combine pig-rearing, fruit-growing, or market-gardening. Among the last named, I can mention one producer who, at the time of writing (13th November), has raised 3,000 chickens during the present season, nearly all pure-bred White Leghorns. He has, in addition, between 1,600 and 1,700 laying hens, and for two months his average yield was 75 dozen eggs a day. All feed was bought, with the exception of green stuff, and being the fortunate possessor of a lucerne paddock of about 2½ acres, he is able to give his flocks as much green stuff as they can eat; and herein is one of the chief factors of his success. He has been a successful market-gardener for the past ten years, and always kept some poultry, but it is only during the past four years that he has taken up poultry seriously, and now gives it far more attention, as it pays much better than vegetable growing. He does not spare money in procuring the best laying strains, as he gave £25 for a pen of seven birds.

Egg production is more profitable here than in any other State of the Commonwealth, owing to the good prices realised. The average wholesale price for 1907 works out at 1s. 6d. per dozen, and will probably be more for the present year, owing to better prices having been realised recently. This is owing to eggs being dearer in South Australia, as Adelaide prices largely affect our markets. Another factor is owing to one of our largest wholesale buyers ceasing to import, and buying entirely locally.

Duck eggs formerly fetched lower prices than hen eggs, but the prejudice against them is fast disappearing, and of late they have been fetching equal values.

The cold storage of eggs during the glut season is being availed of for disposal during the scarce period, and yields a handsome profit. One grower has this season stored 4,000 dozen; still there are ample facilities existing for the storage of much larger supplies, and it will be well worth our poultry farmers paying more attention to this profitable branch of the business.

There is room for great development in the quality of the poultry sent to market for table purposes. There is a great scarcity nearly all the year round of really first-class cockerels, and it will pay our country farmers to give more attention to this branch of the business. If they would kill off all mongrel male birds, and use only varieties such as Orpingtons, Wyandottes, or Plymouth Rocks, a great improvement would result.

Another matter well worthy of attention is to breed good table birds so as to reach the markets when the best prices are realised. This can be done by hatching chickens during the months of April, May, and June, so as to have young birds for sale at six months old, during the months of October, November, and December, when prices are first-class, ranging from 6s. 6d. to 8s. 6d. per pair, according to quality.

Turkeys thrive very well in this State, and there is a strong demand for them, especially at Christmas time, when the markets are generally very bare, consequently prices go very high. The trouble with turkeys is that they wander so far away from their homes that their owners only secure a very small percentage of their hatchies.

The hen turkey makes its own nest, brings out her young, and can rear them without aid or any food beyond that picked up in the bush or stubble fields, but she wanders away with her young, which too frequently disappear, owing to hawks or cats taking the greater proportion of them. To cope with this difficulty I consider it would be necessary to erect wire-netting fences six or seven feet high, and also to pinion the birds if found to escape over that height. The expense would be considerable, still, with an experienced person, I think turkey raising under such conditions would pay handsomely.

The Egg-Laying Competitions, of which three have been held under the supervision of this Department, viz., one at Narrogin and two at Subiaco—have proved a great success as a means of stimulating increased interest in the poultry matters, and the dispersal throughout the State of proved laying qualities. Moreover, these competitions have amply verified the fact that our local poultry keepers are possessed of birds of the highest productiveness, notably the winning pen of ducks (Indian Runners) at the last Subiaco competition. These six birds laid 1,571 eggs, or an average of 262 eggs per bird for the twelve months, which constitutes a record for all Australian Competitions.

At the termination of the past year the writer, during the period of leave, made an inspection of a large number of poultry farms, competitions, and Government farms in New South Wales, Victoria, and South Australia, and saw much of interest and value during the trip, a detailed account of which was given in the *Departmental Journal*.

Since the 1st January last, the writer has been located at the Head Office in Perth, having been transferred from the State Farm at Narrogin. During that period the greater portion of the time has been devoted to giving instruction in poultry matters in the country districts: twenty-nine lectures were given, which were in many cases very well attended, the attendance ranging from 12 to 150, the average audience numbering between 40 and 50. Sixteen shows were visited, where the writer acted as poultry judge, at each of which instruction was given to many persons. A large number of letters were answered, and many persons interviewed at the Office, also notes written for each issue of the Department's *Journal*. The fourth edition of the Poultry Pamphlet has been entirely distributed free: a fifth edition has been prepared, and is now in the printer's hands.

One of the chief hindrances to the production of a good class of poultry is the too frequent use of mongrel male birds, particularly with our general farmers. Many of our principal poultry farmers, who rear only first-class birds—chiefly Leghorns—have a difficulty in disposing of their cockerels at anything like their true value, so send them to the markets to be sold as table

birds, for which they are not suitable. These are just the right class of birds for improving the laying qualities of common stock, and it seems a pity that thousands of these should be slaughtered every year. I would suggest that this Department should purchase the cockerels for distribution throughout the State, and sell them at, say, 10s. per pair, including railage; or if preferred, in cases where not less than ten cockerels were required, exchanges could be made for an equal number of mongrel fowls, which could be sold by auction. An arrangement of this description would cost very little, and would be the means of greatly increasing the egg yield.

There is a great field for research and experimental work with regard to many matters relating to poultry culture in this State, particularly as regards artificial incubation, and the best modes of feeding for egg production, breeding, and fattening respectively. There are many other subjects urgently in need of investigation, which under existing conditions cannot be dealt with. I respectfully suggest that the Department gives these matters serious consideration.

FRANK H. ROBERTSON.

Poultry Specialist and Lecturer.

13th November, 1908.

ANNUAL REPORT OF THE MANAGER, EXPERIMENTAL STATION, HAMEL.

I beg to report on the Hamel Farm for the year ended June 30, as follows:—

Season.

The South-Western District fully maintained its reputation with regard to rainfall, which must have been close on 50 inches. Given these conditions, the cereal crops suffer considerably, both as regards grain and straw. A severe frost at the end of February affected the potato crop to some extent.

The summer being very hot caused the crops (maize, etc.), with the exception of those on the moist lowlands, to suffer in regard to yield.

Work.

Chiefly experimental, for the purpose of ascertaining as far as possible the best variety of cereal, grass, fodder plant, tubers, fruit, etc., for general culture in this State.

Grass Roots and Fodder Plants.

An unusually large number of applicants have been supplied with the above, together with hop sets, packets of maize, peanuts, etc., also sweet potato cuttings. A large number of the State schools were also supplied with parcels of seeds, bulbs, and plants.

Questions Answered.

Re Seeds, Method of Culture, Manuring, etc.—These have exceeded the number of former years, and necessarily absorb much of my time.

Cereals.

These experimental plots suffered from prolonged rains, and yields were light.

Wheat.

Fifty-eight varieties.—The crop was damaged by the late rains causing rust. Yield light, approximately 17 bushels per acre. Some of the best varieties are "53A," "Field Marshal," "Plover," "Baroota Wonder," and "Alpha."

Oats.

Fifteen varieties.—Some of these were much damaged by the wet. Among the best are "Burt's Early," "Clydesdale," "Giant Dakota," "Falman's White." Approximate yield per acre, 20 bushels.

Barley.

Six varieties.—Of these "Russian Black" is the best.

Rye.

Markisohr is one of the best.

Permanent Pasture.

Blocks Nos. 10 and 11 were sown down in June, 1906. Owing to wet some of the seed failed. Tall Fescue, Cocksfoot, Sheep's Burnet, Timothy, Chewing Fescue, Kentucky Blue Grass and Tall Oat Grass have stood fairly well. A few sheep have been depastured on these blocks during the past year.

Grasses, Various.

Have done fairly well, among them being "Rhodes," "Wallaby," and *Paspalum dilatatum*. Of new varieties *Phalaris commutata* has given good results, and is likely to prove a very valuable introduction for permanent pastures for the State, especially for winter feed. For low wet land *Festuca arundinacea* is likely to prove very valuable.

Note re "*Phalaris commutata*."—From observations made by me here, I am strongly of the opinion that this grass will not stand close grazing or feeding in the manner that *Paspalum dilatatum* does.

Of several new American varieties (grasses) *Bromus Marginata* is very promising.

Trifolium subterraneum (clover) is also doing well.

Insect and other Pests.

The worst and most destructive are cutworms, which greatly damage young maize and other plants. Most numerous at commencement of the hot weather.

Miscellaneous Plants.

Yams and Tanniers from Ceylon and Cassavas grew fairly well during the summer; towards winter they were removed to the greenhouse.

Unsuitable for this district, and some tubers (Yams and Tanniers) were sent to the North-West, where they are more likely to succeed.

"Pigeon Pea," from India, grew remarkably well; survived the winter, and is likely to produce seed this summer.

Bananas.

Four Varieties.—The ordinary Plantain thrive well, and produced fair bunches of good flavoured fruit, until the course of Samson's Brook was altered (they were originally close to the brook). The fruit seems to shrivel and dry up, hardly ripening.

"Atikeher."—Very tall growing variety. Ripens fruit, but this is useless, being mostly seeds.

"Chinese Dwarf."—This variety does not mature fruit to perfection.

"Kolkulla."—This variety (near water) ripens fair bunches of fruit of good quality.

The above varieties were introduced from Ceylon.

Cucumbers.

One Variety.—"Early White"; a very prolific sort and of good variety. Is never bitter to the taste.

Pumpkins.

Five Varieties.—Reliable sorts for home use and market being Table Crown and Bugle, also a new variety "Silver Nugget," which is well flavoured and keeps well. "Congo Squash," a small prolific variety, a good cooker and keeper.

Tomatoes.

Four Varieties.—The best are "Sunrise," which is an early prolific and smooth tomato, and "the Hummer," a heavy smooth tomato, late.

Maize.

Thirty-one Varieties.—Planted on moist low land some varieties did very well, producing nice cobs, filled with good grain. Several new introductions from America were included, also some sweet corn. Taken as a whole, this class of cereals gave results equal, and perhaps rather superior, to those of former years. In February about 14 acres of this cereal were planted for fodder. Although very late for planting, a fair crop ensued, part of which was sent to the State Farm, Brunswick. All maize for cobbing or seed purposes should be sown before the month of December.

Potatoes.

About 15 acres were planted in November, 1907, on blocks 12, 13, 14 (owing to boggy nature of the ground planting could not be started earlier). The crop was greatly damaged by a frost occurring at a rather unusual time of the year, viz., the end of February. The yield was at the rate of 30 cwts. to the acre.

Another area, consisting of about 24 acres, was planted. The seed, procured locally, was, however, inferior, a large proportion of it failing entirely (about 10 acres in extent). The yield from these areas was very light. The tubers were, however, of excellent quality, clean and free from disease; but taken as a whole the crop was poor and under the average. More than 40 varieties were included in these plantings.

Peanuts.

Five Varieties.—The most prolific, best flavoured, and largest is the "White Valencia." Yield, approximate per acre, 2,000lbs. This should be a profitable crop to grow on soil containing limestone properties.

Hops.

Three Varieties.—Owing to the propitious weather the quality of the crop was of the best, and the yield good. "Oregon" (American variety) was most prolific and of good colour. Yield, approximate per acre, 600lbs. of saleable sun-dried hops. Several thousand sets have been distributed to various applicants. I consider the Blackwood and adjacent country near the coast most suitable for the culture of hops.

Cotton.

American Upland varieties give the best results here. The autumn being exceptionally fine, the bolls ripened exceedingly well, and the lint was of good colour. Most of the plants were those that survived the previous winter, thus flowering and maturing the bolls very much earlier than any of those sown in November. "Louisiana Prolific," "Russell's Big Bole," "King's Improved."—These three varieties belong to the Uplands.

Yield, approximate per acre, 800lbs., lint and seed. The Indian varieties tested here made good growth, but the results are insignificant, the bolls being very small.

Fodder Plants.

Four varieties of the sorghum family were grown, and gave good results. Of these, White Kaffir Corn and Undendibule, this latter a sweet variety, are of the best.

Millets.

Three varieties, of which "Japanese" is the most profitable plant to grow for a summer crop of green fodder.

Teosinte.

This valuable fodder plant from Central America made fine growth to 12ft. This plant is suitable for culture on rich moist land only.

Broom Millet

Thrives exceedingly well on moist lowland here, producing long seed stems which should make admirable brooms.

Three varieties grown here, the best being "Evergreen," the seed being originally introduced from America. Broom Millet will grow well on land that produces good sorghum.

Cow Pea.

Seven varieties. Of these "Black" is one of the best, but "New Era" matures earliest and yields a large quantity of seed.

These peas, grown in combination with sorghum or other summer fodder plant, make an excellent combination for the purpose of ensilage; at the same time, they (the peas) are good soil improvers. The seed should not be sown until the weather is warm, say November.

Beans.

Six varieties; best of these "White Wax" and "Powell's Prolific."

Sweet Potato.

Seven varieties. Among these are "Cluster," Yellow Spanish, Red Jersey, Big Stem Yellow and Rosella, the best being "Cluster," which produces its tubers close to the stem, making it more convenient for digging. Results—although fairly good, the tubers were damaged by wet.

Rice.

Two varieties. These, owing to the late sowing, did not mature.

Sisal Hemp.

Several varieties. The soil, however, is unsuitable, owing to the dampness, for the successful cultivation of this useful plant.

Orchard.

Taken as a whole, it has done well. Apricots and Japanese Plums showed a fair amount of fruit.

Almonds—these had a fair show of nuts.

Oranges and lemons—these have also thriven well.

Fig Plantation.

Trees have made good progress. Smyrna and Capri varieties made very fine growth with plenty of fruit. A number of fig cuttings were planted and are growing well.

New Zealand Flax.

Hill variety. Has made good growth.

Franco-British Exhibition.

A number of exhibits comprising Cereals, Hops, Maize Cobs, Cotton, etc., were prepared for this Exhibition.

G. F. BERTHOUD.

ANNUAL REPORT OF THE STOCK DEPARTMENT.

The Under Secretary for Agriculture.

I have the honour to submit the annual report of this branch for the past term, and in doing so desire to thank the staff for their attention to duty and generally for the capable manner in which they have carried out their various works.

Owing to my own absence on leave during the early part of the year, and additional labour associated with the Century Camels, some difficulty was experienced in coping with the work, but it is gratifying to report that it was accomplished without any undue delay being occasioned in Stock business.

The work at the Port was carefully supervised by Inspector Gibbons during my absence, and since my return Inspector Burns has again resumed his duties there. Owing to the spread of tick in East Kimberley, Inspector Haly has had a particularly busy season in that part of the State. Inspector

Glen on the Goldfields and Inspector Mills at Geraldton, have both carefully looked after the Department's interests in those centres. Owing to Inspector Gibbons transference to Fremantle, an additional Inspector had to be appointed for Northam, and Inspector Higgins is now in charge of that district.

Surra.

It is gratifying to advise that the fears entertained some twelve months ago, that this particular disease has been introduced into the State by the introduction of camels from India, has since been totally dispelled.

A few head of the shipment were found, on examination of the blood supply and other means, to be harbouring Trypanosomes, and as a preventative measure these were destroyed. The others, after an exhaustive examination were released, and are now at work in the Onslow and Port Hedland Districts.

Tuberculosis.

The minds of the public have been much disturbed by the many alarming reports which have recently been current respecting the prevalence of this disease amongst the dairy herds of the State.

Seeing that this particular trouble is common to all dairy herds throughout the world, it is not surprising to find that the same occurs amongst our own herds.

It is needless, however, to become alarmed about the matter, as with careful supervision and the elimination of all animals showing clinical lesions, the disease can be kept in check, and if not totally eradicated, at least reduced to a minimum.

Possibly in no other part of the world are dairy cows subjected to such severe treatment as are those in this State. The majority imported from the Eastern States have frequently to encounter a rough sea voyage before landing, and although well cared for and highly fed when confined to the dairies, immediately on their becoming dry, they are turned out to subsist on the rough, coarse herbage common to the State. As a result, a rapid falling off in condition occurs, and should the bacillus of tuberculosis be latent in the system, through lowered vitality they become active, and pronounced; tuberculosis follows, and necessitates the animal's destruction. It is, therefore, obvious, before any degree of immunity is to be obtained from the disease, it will be necessary to have our dairy stock reared locally, and that better pasturage be provided by cultivation and laying down of grasses.

Epizootic Pleuro-Pneumonia.

This disease, which was so prevalent in the State some few years ago, has caused a little trouble during the last twelve months. Lesions of an old standing character were discovered amongst the early shipments of cattle from East Kimberley, but nothing of an active nature was found, and no injury resulted from their transportation to this part of the State. As the result of the importation of cows from South Australia, the disease made its appearance in a local dairy herd, but was successfully stamped out by the destruction of the affected animal, and inoculation of the others.

Swine Fever.

With the exception of the outbreak which occurred during the latter part of the winter, this disease has caused no loss to the State.

The outbreak mentioned may be attributed to a congested condition of piggeries, resulting from collecting by dealers large supplies to one centre, for the purpose of holding for increased market values.

This occurred at a season of the year when sanitary conditions could with difficulty be maintained, and in consequence, once the disease was established, its spread was rapid, and proved serious to holders.

The experience gained, however, has had the beneficial effect in causing dealers to become more careful in collecting supplies, and the better sanitary arrangements now being maintained may prevent further outbreaks from occurring.

Ticks.

The specially good season which has prevailed in East Kimberley has favoured the spread of tick, and country which previously had been free from the pest, has now become infected. The local Inspector has recently reported their presence in close proximity to the tick line, and for this reason the matter of removing the boundary further west is now under consideration, as also the appointment of an inspector to patrol that particular part of Kimberley, and by these means, if possible, prevent their further spread in that direction.

Tick Fever.

The increased prevalence of the tick pest has had its usual injurious consequences in severe outbreaks of Tick Fever. This was particularly noticeable amongst mobs of fats travelling to Wyndham for shipment to Fremantle.

On entering the heavily infected country, a large percentage developed symptoms of fever, but as precautionary measures were immediately taken, the mortality was in consequence reduced to a minimum.

It is possible that this trouble may be successfully obviated by the construction of a dip at a convenient centre on the route to Wyndham, and the cattle immersed before entering the heavily infected country. Such treatment would be the means of keeping them practically free from the pest until the remainder of the journey was completed.

Kimberley Diseases in Horses.

The profuse growth of herbage, resulting from a favourable season, has brought about a recurrence of this trouble, and in some instances the losses have been considerable. It is evident that this complaint will always be more or less a source of worry to settlers in the Kimberleys, as the natural conditions prevailing in these parts, although suitable for cattle are unfavourable for horses.

Seasons associated with light rains and consequent less profuse growth are not so injurious, but reverse conditions make the digestible nature of the herbage difficult, and in consequence many fall victims to disease.

Settlers could materially prevent losses by preparing animals for sudden changes, and artificially feeding them at a season of the year when the conditions are most unfavourable.

Advice has been sought with respect to a number of Endemic Diseases, and the information supplied has usually had beneficial effects. Amongst them was a form of Rickets affecting young cattle in the South-West portion of this State. This was found to result from a lack of lime salts in the natural pastures, and beneficial results were accrued from supplying bone meal in convenient centres for the use of the stock.

Poison Plants.

The recent discovery by the Government Analyst of an antidote, more especially for York Road Poison, has been the means of saving many animals from falling victims to this cause. Yet reports still come to hand of severe losses accruing from poison.

This cannot well be obviated when stock are running over large pastoral areas where poison is known to exist. But in the case of small holdings and public roads, every effort should be made to have these noxious plants eradicated, and by this means avoid all possibility of danger.

Imports.

It is pleasing to find that importations from the Eastern States are steadily on the decline, and that with one exception a substantial increase in all lines of stock have been registered.

Horses show an increase of over 8,000, and yet there is room for greater production. Possibly in no period of the State's history has there been such a bright outlook for breeding this class of animal. Both in draughts and light harness horses a steady demand is always in existence, and the prices obtainable are sufficiently remunerative to satisfy the most covetous person. A little stimulus given to this industry would be the means of not only supplying our own requirements, but also result in an export trade, which would mean a considerable pecuniary gain to the State.

The importation of fat cattle from the Eastern States has now practically ceased, all requirements being met *locally*. An increase of over 69,000 has been registered for the past year.

The time is not now far distant when an export trade will be developed in beef, and the installation of freezing works at Wyndham will be a step in this direction.

Sheep have increased locally by over 354,000, and this means a big impetus will now be given to lamb production. Owing to the congested state of the markets in Great Britain last year, the lamb export did not prove profitable, but breeders should not be alarmed, as values will improve, and the trade generally should be looked upon as productive of particularly good results accruing to the State.

Pigs are the only recorded instance of a decrease occurring, and this may be attributed to the high ruling values for feeding stuffs. The high price of wheat especially caused the farmer to take advantage of the market, and in consequence the pig industry was neglected.

With a cheaper cost of food supplies, and especially the fostering of the dairying industry, will mean a considerable increase in pig farming.



North-West Seams,
Prospectors (Hamilton and West) 15 miles out of Wynndham.

Inspector Cruickshanks reports as follows on the horses purchased for the various Departments:—

109 light horses, averaging £30
50 heavy draughts, averaging £60

159

Disposals.

74 light horses
173 heavy draughts

247

	£	s.	d.
55 transferred amongst Departments, averaging	52	10	0
87 heavy draughts, surplus, sold to the public, averaging	51	0	0
78 light horses, principally sold at Condon "Rabbit Proof Fence"			
27 sold without reserve, being mostly condemned police horses, averaging	8	0	0

Inspection of Horses.

Over 600 were inspected for suitability and soundness. The greatest care was exercised to secure the best animals at the lowest market rates. That no complaints have been received is the best proof that the effort was successful.

General Remarks.

During the year many suggestions were made for the better carrying out of the work, and considerable progress has been made; notably, the granting of a site by the Surveyor General for stables in Wittenoom Street; and a contract to erect a suitable building at a cost of £350 has been let.

Paddocks.

Towards the latter end of last summer, the grass paddocks at Kenwick Park were utilised at a moderate charge per week. This year it is intended to use the grass flats at the State Farm, Brunswick, and it is anticipated that this arrangement will be much appreciated.

Suggestions.

Horses belonging to the Crown should be under the absolute control of the Stock Department, and loaned out to Departments either on the basis of valuation or rent. To do this successfully it would be necessary to take over the Public Works "Stock Suspense Account" still in operation. When the Stock Department assumed control this was intended to be done.

During the past year great satisfaction has been expressed by the heads of the various Departments regarding the horse supplies. There can be no question that under the present method, not only a great saving of money has been effected, but the practice has been a good one, and the judicious system of transferring and placing of horses from one Department to another prevents many sacrifices. The Departments would be still better served, and the interests of the Crown greatly enhanced, were horses purchased from a common fund, and in turn let out to construction works on rental.

Stock Imported at Fremantle from 1st July, 1907, to 30th June, 1908.

From	Horses.	Cattle.	Bulls.	Cows.	Sheep.	Rams.	Ewes.	Mules.	Donkeys.	Goats.	Pigs.	Dogs.	Ferrets.	Guinea Pigs.	Camels.	Poultry.	Pigeons.
Eastern States	750	210	32	925	75,085	4,519	9,104	3	3	1	Nil	101	67	50	Nil.	1,385	3,033
New Zealand	..	..	..	..	..	..	Nil.	..	..	..	..	..	..	..	..	..	..
England	..	..	9	..	..	..	..	..	1	..	2	4	..	..	..	..	49
Belgium	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
America	..	..	..	..	..	..	Nil.	..	..	..	..	..	..	..	..	..	..
India	..	..	..	..	..	..	Nil.	..	..	..	..	..	..	..	..	..	..
South Africa	..	..	..	..	..	..	Nil.	..	..	..	..	..	..	..	..	..	..
Total	750	210	37	925	75,085	4,519	9,104	3	4	1	2	105	67	50	Nil.	1,434	3,033

Inspection Fees collected, £479 13s. 0d.

Exports from Fremantle from 1st July, 1906, to 30th June, 1908.

Stock.

Destination.	Horses.	Cattle.	Sheep.	Pigs.	Dogs.	Poultry.	Birds.
Eastern States	11	..	..	..	23	55	3
New Zealand	..	..	..	..	..	30	..
United Kingdom	..	..	..	..	..	..	..
South Africa	..	..	..	..	..	..	..
Singapore	..	..	..	..	12	..	..
Netherlands, India	9	..	22	..	..	..	..
Total	20	..	22	..	35	85	..

Exports from Fremantle from 1st July, 1907, to 30th June, 1908.

Hides, Skins, etc.

Destination.	Hides.	Sheep Skins.	Kangaroo Skins.	Calf Skins.	Goat Skins.	Rabbit Skins.	Opossum Skins.	Cowhair.
Eastern States	23,253	12	115,632	774	..	..	..	3
France	..	106	..	..	..	..	1,000	..
Total	23,253	118	115,632	774	..	..	1,000	3

Export Certificates—Fees Collected, £28 13s. 6d.

Revenue Collected by the Stock Department from 1st July, 1907, to 30th June, 1908.

Port.	Revenue.	
	£	s. d.
Fremantle	985	3 1
Albany	93	1 6
Esperance	0	12 6
Geraldton	7	10 0
Eucla	11	4 4
Bunbury	5	9 4
Wyndham	32	8 6
Roebourne	1	2 6
Derby	3	4 6
Total	£1,139	16 3

Number of the Principal Live Stock in Western Australia on 31st December, 1907.

Horses.	Cattle.	Sheep.	Pigs.
113,117	759,046	3,694,852	53,122

Stock landed at Fremantle from North-West Ports from 1st July, 1907, to 30th June, 1908.

From	Cattle.	Horses.	Sheep.	Pigs.	Donkeys.	Dogs.
Wyndham ..	14,957	18	..	28	..	..
Derby ..	8,415	3	12,208	..	..	..
Port Hedland ..	1,145	67	5,397	..	1	..
Cossack ..	88	30	..	..	..	..
Onslow ..	..	13	2,025	..	..	..
Carnarvon ..	2,768	36	57,829	..	..	1
Point Sampson ..	229	122	..	..	..	..
Broome ..	612	4	1,936	..	..	..
Total	28,214	293	79,395	28	1	1

*Exports from Fremantle from 1st July, 1907, to 30th June, 1908.**Hides and Skins, etc.*

Destination.	Hides.	Sheep Skins.	Kangaroo Skins.	Calf Skins.	Opossum Skins.	Cow- hair.
Eastern States	23,253	Bales. 12	115,632	774	..	Bales. 3
France	..	106	..	..	1,000	..
Total	23,253	118	115,632	774	1,000	3

Stock Exported from Fremantle from 1st July, 1907, to 30th June, 1908.

Destination.	Horses.	Cattle.	Sheep.	Dogs.	Poultry.	Birds.
Eastern States	23	55	3
New Zealand	30	..
United Kingdom
South Africa
Singapore	12	..	..
Netherlands, India	..	9	22	..	..	..
Total	20	..	22	35	85	3

R. E. WEIR,
Chief Inspector of Stock.

REPORT OF INSPECTOR J. MILLS.

Chief Inspector of Stock.

Sir,—

I beg to make the following report for the year ending 30th June, 1908:—

Horses.—These have been particularly healthy for past year, excepting that an enormous percentage of mares, principally draught, “abort” in the coastal districts, and so many losses have occurred. Many of our prominent breeders of this class of animal have discontinued attempting to breed them. This is much to be regretted, for with the development of our agricultural land locally bred draughts will not be equal to the demand, and young settlers just starting cannot afford to pay fancy prices for imported animals.

Cattle.—Throughout the year cattle have been healthy. Only a few local ailments.

Sheep.—Ticks still exist in a few flocks along the coast, particularly about South Greenough and Dongarra, but infested sheep are regularly dipped.

Pigs.—Remain quite healthy, and no complaints of any kind from breeders.

General.—The season is all that could be desired, magnificent rains having fallen everywhere, and as the first showers came in April, continuing at nice intervals, the lambing ought to be equal to past records.

Ewes imported to this district by Department of Agriculture have done remarkably well and still lambing, and there continues a considerable demand for ewes in this district.

Crops are looking well, and a few farmers are still seeding. Local fats will be in market early; a few small lots of lamb being ready at present moment.

The pastoral and agricultural prospects in the Victoria District have never been more promising, and with a lot of new land opened up for settlement, the outlook is most assuring for ensuing year.

JOSHUA MILLS,

Inspector of Stock, etc.

Geraldton, 14th July, 1908.



North-West Scenes.

1. Tropical Cultivation, Beagle Bay Mission.
2. Natural Bush.

DISEASES OF ANIMALS AND MEAT INSPECTION IN WESTERN AUSTRALIA.

FOR THE YEAR ENDING 30TH JUNE, 1908.

By J. BURTON CLELAND, M.D., Government Pathologist and Bacteriologist.

From the Department of State Medicine and Public Health.

During the year under review, 168 diseased conditions in various **animals** were submitted for further examination to the Laboratory. The following is a review of some of the more important of these:

ANIMAL PARASITES.

- Strongylus paradoxus in lungs of pigs; numerous specimens.
- Strongylus micuris in lungs of calf; once.
- Strongylus filaria in lungs of sheep; causing a mild epidemic.
- Spiroptera microstoma forming nodules in the stomach of a horse.
- Oesophagostoma Columbianum, in larval form, in small nodules in the intestines of bullocks; common.
- Acarus in scab of donkey.
- Piroplasma bovis in blood corpuscles of cattle.
- Balbiania gigantea in the oesophagus of sheep from Eastern States.

BACTERIAL DISEASES.

- Tuberculosis of an imported fowl, liver, spleen, etc.; much infected.
- Pyæmic foci, kidney of pig; probably due to septic pyelitis.
- Favus in a mouse.
- Tinea in a horse.

NEOPLASMS.

Carcinoma of the pancreas in a bullock.—This consisted of a large tumour the size of a tennis ball, somewhat encapsuled and moderately firm. In one portion was a large encapsuled colloid mass. Sections showed large epithelial cells in columns.

Epitheliomata, eyelids of horses.—Two cases of this occurred. One was a typical epithelioma with early cell-nests. The other showed no cell-nests, and the arrangement of the cells strikingly suggested the appearance of the liver.

Fibro-sarcoma, eye, mare.—This growth was on the inner side of the eye, pressing the globe aside. It seemed capsuled and was firm, fibrous, and glistening on section. Microscopically there were large spindle-cells, often whorled, in a dense fibrous matrix.

Myxo-fibroma, foot of bullock.—A large tumour the size of one's fist. On section, it appeared to consist of dense fibrous tissue in which were situated:—

- (a.) A yellowish, semi-transparent, myxomatous-looking encapsuled growth the size of a big duck's egg. Microscopically myxomatous.
- (b.) A smaller, white, more fibrous-looking encapsuled growth, microscopically fibromatous.

Encapsuled fibro-adenoma of mamma of sheep.

Angiomata of liver of sheep.—Extensive cavernous angiomata.

VARIOUS CONDITIONS.

Deep melanotic pigmentation of capsule of supra-renal body and surrounding connective tissues in a bullock. Microscopically there was a deposit of melanin in the capsule, extending into the connective tissue between the outermost cells of the gland.

Melanotic pigmentation of membranes of spinal cord and of connective tissues in a bullock.

Cirrhosis of liver of bullock.—Dense cirrhosis isolating small areas of hepatic cells.

Malformation of intestine of sheep.—In the small gut above the caecum were numerous partitions and septa splitting up the lumen for some distance. The lumen was apparently very devious and it was impossible to follow it. The presence of faeces in the caecum beyond indicated however that the food did filter through slowly, perhaps by means of the dilated loculi. This condition might be due either to a congenital malformation or to the results of an adhesive enteritis.

Acute yellow atrophy (?) of sheep.—The liver was very soft and flaccid and intensely fatty, showing a mixture of yellowish and reddish areas. Microscopical sections, in the degeneration of the liver cells, corresponded with acute yellow atrophy in man. The disease was undoubtedly of toxic origin.

Nodules containing giant cells on the peritoneum of a lamb.—These small nodules were scattered over the peritoneum, and a few were on the pleura. The larger had a little granular pus. No tubercle bacilli or actinomyces were seen. Microscopically, the nodules consisted of granulomatous tissue with scattered giant cells.

Inspection of Meat for the Year 1907-1908.

It is pleasing to be able to record that the percentage of tuberculosis in cattle for the present year, viz., 5.4 per cent. is distinctly less than that for the previous one which was 7.1 per cent. In the great majority of the cases the lungs were affected, and next to these the various lymphatic glands of the head. Certain districts of the State appear to furnish by far the larger portion of animals affected with this disease.

Actinomycosis is moderately prevalent in cattle. All the fluke cases have again been in imported animals. Interesting melanotic conditions were again met with. Some instances of tick fever were found in non-immune cattle, the disease having been contracted during transit by sea or at Robb's Jetty while awaiting slaughter.

Sheep are still very much infected with *Cysticercus tenuicollis*. There was very little tuberculosis amongst the pigs, but some cases of swine fever.

I would like to place on record the enthusiasm and thoroughness displayed in their work by the Meat Inspectors of the Central Board of Health who are stationed at Robb's Jetty and at Kalgoorlie, through whose efforts I am able to submit the tabulated results now presented, and to whom I am indebted for many interesting and valuable specimens.

TOTAL ANIMALS EXAMINED BY INSPECTORS OF MEAT FOR YEAR JULY 1st, 1907, to JUNE 30th, 1908.

(Robb's Jetty, Metropolitan and Kalgoorlie Abattoirs.)

Cattle	.. .. .	26,563
Calves	.. .. .	356
Sheep and Lambs	.. .. .	185,554
Pigs	.. .. .	9,336

Cattle with pathological lesions, 3,646 or 13.7 per cent. of those examined.

Sheep with pathological lesions, 14,024 or 7.5 per cent. of those examined.

Pigs with pathological lesions, 1,393 or 14.9 per cent. of those examined.

TUBERCULAR CATTLE.

Total cattle with tubercular lesions 1,436 or 5.4 per cent. of those examined, and 39.3 per cent. of those with pathological lesions.

Of tubercular cattle were infected :—

The lungs in	.. .. .	1,057
The head glands in	.. .. .	593
The liver, peritoneum or abdominal organs in	.. .. .	66
The serotal glands in	.. .. .	39

CATTLE.

TUBERCULOSIS.

Generalised (miliary or caseous, etc., one in uterus)	.. .. .	45
Lungs (pneumonic and caseo-purulent)	.. .. .	228
Lungs (pleuritic nodular form)	.. .. .	5
Lungs (bronchial or mediastinal glands)	.. .. .	39
Lungs (unspecified)	.. .. .	73
Lungs and retropharyngeal or head glands	.. .. .	244
Lungs and retropharyngeal or head glands and liver	.. .. .	27
Lungs and retropharyngeal or head glands and liver and suprasternal glands	.. .. .	1
Lungs and retropharyngeal or head glands and liver and preapular gland and muscles around	.. .. .	1
Lungs and retropharyngeal or head glands and pleura and pericardium	.. .. .	1
Lungs and retropharyngeal or head glands and serotal glands	.. .. .	1
Lungs and retropharyngeal or head glands and rumen and capsule of spleen	.. .. .	1
Lungs and retropharyngeal or head glands and rumen	.. .. .	1
Lungs and pericardium	.. .. .	1
Lungs and liver	.. .. .	19
Lungs and liver and suprasternal gland	.. .. .	1
Lungs and liver and scrotum	.. .. .	1

CATTLE—TUBERCULOSIS—*continued*

Lungs and liver and pancreas	2
Lungs and liver and pleura	1
Lungs and liver and pericardium	1
Lungs and liver and mesenteric glands	2
Lungs and uterus	1
Lungs and kidney	1
Lungs and scrotal glands	5
Lungs and scrotal glands and sublumar glands	3
Retropharyngeal or head glands	313
Retropharyngeal or head glands and liver	1
Retropharyngeal or head glands and scrotal glands and sublumar glands	1
Retropharyngeal or head glands and scrotal glands	1
Mesenteric glands	2
Scrotal glands	22
Scrotal glands and sublumar glands	4
Scrotal glands and sublumar glands and precrural gland	1
Scrotal glands and penis	1
Liver	1
Liver and mesenteric glands	1
Kidney	1
Udder	1
Scapular muscles	1
Cervical vertebrae	1

MIXED INFECTIONS.

Tuberculosis and Tick Fever—

Tuberculosis of lungs and head glands. Tick fever ..	1
Tuberculosis of lungs and head glands and scrotal glands. Tick fever	1

Tuberculosis and Tick Anaemia—

Tuberculosis of lungs and head glands. Tick anaemia ..	1
--	---

Tuberculosis and Hydatids—

Tuberculosis of lungs. Hydatid of lungs	4
Tuberculosis of lungs. Hydatids of liver	9
Tuberculosis of lungs and head glands. Hydatid of liver	3
Tuberculosis of head glands. Hydatid of lungs and liver	1

Tuberculosis and Actinomycosis—

Tuberculosis of lungs. Actinomycosis of liver	1
Tuberculosis of lungs. Actinomycosis of femoral muscles (wound)	1
Tuberculosis of head glands. Actinomycosis of sup. maxilla	1

Tuberculosis and other conditions—

Tuberculosis of head glands. Abscess of liver	1
Tuberculosis of head glands. Melanosis of liver	1
Tuberculosis of head and lungs. Pregnancy	1
Generalised tuberculosis. Melanosis of endocardium	1

Total tubercular cattle 1,436

ACTINOMYCOSIS.

Total Cattle slaughtered, 26,563.

Total Cattle slaughtered with pathological lesions, 3,646.

Total Cattle slaughtered with actinomycosis, 282.

Lesions of Actinomycosis—

Generalised	1
Glands of head, tongue, etc.	142
Glands of head, tongue, and jaw bones	1
Glands of head, tongue, and muscles of jaw	2
Glands of head, tongue, and lungs	1
Glands of head, tongue, and liver	3

CATTLE—ACTINOMYCOSIS—continued.

Lesions of Actinomycosis—continued—

Muscles of jaw	..	..	..	..	..	17
Jaw bones	..	..	..	..	..	17
Jaw bones and udder	..	..	..	..	..	1
Lungs	..	..	..	..	..	28
Liver	..	..	..	..	..	34
Liver and rumen	..	..	..	..	..	1
Liver and kidney	..	..	..	..	..	1
Intestines	..	..	..	..	..	1
Abdominal cavity	..	..	..	..	..	2
Omentum	..	..	..	..	..	2
Rumen	..	..	..	..	..	2
Rumen, omentum, spleen, and bladder	..	..	..	..	..	2
Rumen, omentum, reticulum and liver	..	..	..	..	..	4
Rumen and omentum	..	..	..	..	..	1
Rumen and omentum and peritoneum	..	..	..	..	..	1
Rumen and omentum and abdominal muscles	..	..	..	..	..	1
Muscles of abdomen	..	..	..	..	..	1
Costal muscles (wound)	..	..	..	..	..	1
Spermatic cord	..	..	..	..	..	10
Tail	..	..	..	..	..	1
Udder	..	..	..	..	..	2
Preerural gland	..	..	..	..	..	1

ANIMAL PARASITES OF CATTLE.

Hydatids—

Lungs	..	..	..	..	..	83
Liver	..	..	..	..	..	47
Lungs and liver	..	..	..	..	..	45
Lungs, liver, and spleen	..	..	..	..	..	1
Liver (Multilocular)	..	..	..	..	..	1
Unspecified	..	..	..	..	..	85
Total	..	..	..	..	..	262

<i>Fluke (Distoma)</i>	..	..	..	..	..	0
<i>Tick fever (due to piroplasma bigeminum)</i>	..	..	..	..	..	449
<i>Intestinal nodules (due to larvae of Oesophagostoma Columbianum)</i>	..	..	..	..	..	43

INFLAMMATORY DISEASES OF CATTLE.

Fibrosis of lungs, chronic abscesses or pleuritic adhesions	..	..	..	..	..	351
Broncho-pneumonia ("ship pneumonia," lobular pneumonia, etc.)	..	..	..	..	..	228
Broncho-pneumonia and congestion of liver	..	..	..	..	..	48
Broncho-pneumonia and chronic abscess of liver	..	..	..	..	..	2
Pleuro-pneumonia (contagious)	..	..	..	..	..	29
Pneumonia (traumatic)	..	..	..	..	..	1
Abscess of lung (due to broken rib)	..	..	..	..	..	1
Pleuritic adhesions with peritoneal adhesions	..	..	..	..	..	1
Pleuritic adhesions with pericarditis	..	..	..	..	..	2
Pleuritic adhesions with chronic abscess of liver	..	..	..	..	..	1
Pleuritic adhesions with cirrhosis of liver	..	..	..	..	..	1

Abscesses—

Liver (chronic)	..	..	..	..	..	135
Liver and reticulum	..	..	..	..	..	1
Liver and peritoneum	..	..	..	..	..	1
Liver and rumen	..	..	..	..	..	1
Rectum from injury	..	..	..	..	..	4
Pancreas	..	..	..	..	..	1
Omasum	..	..	..	..	..	1

CATTLE—continued.

Abscesses—continued—

Rumen	..	..	..	..	..	..	1
Reticulum	..	..	..	..	..	..	1
Omentum	..	..	..	..	..	..	1
Kidney	..	..	..	..	..	..	1
Kidney, rumen, and peritoneum	..	..	..	..	..	..	1
Liver, lungs, and diaphragm (from spear wound)	..	..	..	..	..	..	1
Head	..	..	..	..	..	..	3
Tongue	..	..	..	..	..	..	1
Tail	..	..	..	..	..	..	1
Muscles of sternum	..	..	..	..	..	..	1
Femoral muscles	..	..	..	..	..	..	1
Popliteal gland	..	..	..	..	..	..	1
Sublingual salivary gland	..	..	..	..	..	..	1
Peritonitis	..	..	..	..	..	..	1
Peritonitis (septic)	..	..	..	..	..	..	2
Pericarditic adhesions	..	..	..	..	..	..	4
Septicaemia	..	..	..	..	..	..	2
Inflammation	..	..	..	..	..	..	4
Kidney (inflammation)	..	..	..	..	..	..	1
"Gastric fever"	..	..	..	..	..	..	1
Septic metritis	..	..	..	..	..	..	1
Ulceration of gall bladder	..	..	..	..	..	..	1

Injuries and Bruising—

Various	..	..	..	..	..	..	144
Head, broken horn	..	..	..	..	..	..	1
Muscles of fore-quarter	..	..	..	..	..	..	1
Injuries to rectum	..	..	..	..	..	..	2
Peritonitis (due to injury when shipping)	..	..	..	..	..	..	3
Carcass condemned for gangrene	..	..	..	..	..	..	1

MELANOTIC CONDITIONS.

Melanosis of meninges and nasal cavities	..	..	..	..	..	5
Melanosis of liver	..	..	..	..	..	6
Melanosis of liver and kidney	..	..	..	..	..	1
Melanosis and pleuritic adhesions	..	..	..	..	..	10
Melanosis of suprarenal gland	..	..	..	..	..	1
Melanotic fibroma, upper lip	..	..	..	..	..	1
Melanotic fibroma, skin	..	..	..	..	..	2

VARIOUS CONDITIONS.

Liver, cirrhosis	..	..	..	..	..	..	11
Liver, fatty	..	..	..	..	..	..	106
Liver, fatty, and mammitis	..	..	..	..	..	..	1
Liver, fatty, and pericarditic adhesions	..	..	..	..	..	..	1
Liver, congested	..	..	..	..	..	..	3
Liver, angioma	..	..	..	..	..	..	1
Liver, necrotic foci	..	..	..	..	..	..	2
Cystic kidney from calculus	..	..	..	..	..	..	1
Retention cyst, kidney	..	..	..	..	..	..	1
Vesical calculus	..	..	..	..	..	..	1
"Fat necrosis" round kidney	..	..	..	..	..	..	9
Chalky deposit in brisket	..	..	..	..	..	..	1
Muscular atrophy	..	..	..	..	..	..	1
Tumors	..	..	..	..	..	..	3
Fibroma, head	..	..	..	..	..	..	1
Emaciated carcasses	..	..	..	..	..	..	5
Pregnancy and emaciation	..	..	..	..	..	..	1
Calves, immaturity and emaciation	..	..	..	..	..	..	4
Morbid pregnancy	..	..	..	..	..	..	1

CATTLE—continued.
LOCALITIES OF DISEASED ANIMALS.

<i>Tuberculosis</i> —						
East Kimberley District	..	..	..	..	..	865
West Kimberley District	..	..	..	..	..	134
Gascoyne District	..	..	..	..	..	18
Murchison District	..	..	..	..	..	19
Midland District	..	..	..	..	..	143
Williams District	..	..	..	..	..	2
<i>Actinomycosis</i> —						
East Kimberley District	..	..	..	..	..	51
West Kimberley District	..	..	..	..	..	38
Gascoyne District	..	..	..	..	..	46
Murchison District	..	..	..	..	..	34
Midland District	..	..	..	..	..	77
<i>Hydatids</i> —						
East Kimberley District	..	..	..	..	..	5
Murchison District	..	..	..	..	..	3
Midland District	..	..	..	..	..	127
York District	..	..	..	..	..	1
Williams District	..	..	..	..	..	4
<i>Tick Fever</i> —						
East Kimberley District	..	..	..	..	..	128
*West Kimberley District	..	..	..	..	..	308
*Midland District	..	..	..	..	..	12
*Coogee District	..	..	..	..	..	1

*These cattle came from the above districts but the disease was not contracted there but during transit or while awaiting slaughter.

SHEEP.

Number of sheep examined, 185,554.

Number with pathological lesions, 14,024, or 7.5 per cent. of those examined.

<i>Animal Parasites</i> —						
Cysticercus tenuicollis in liver, lungs, etc.	..	..	..	..	..	7,759
<i>Hydatid (C. echinococcus)</i> —						
Of liver	..	..	..	..	..	1,509
Of lungs	..	..	..	..	..	150
Of liver and lungs	..	..	..	..	..	648
Of kidneys	..	..	..	..	..	1
Unspecified	..	..	..	..	..	1,496
Total	..	..	..	..	..	3,804
Hydatid and fluke in liver	..	..	..	..	..	17
Fluke (Distoma) in liver	..	..	..	..	..	1,081
Balbiana in oesophagus	..	..	..	..	..	6
Strongyli in lungs	..	..	..	..	..	52
<i>Infectious and Microbic Conditions</i> —						
Nodules († tubercular) with giant cells, peritoneum and omentum, lamb	..	..	..	..	..	1
Pseudo-tuberculosis of popliteal gland	..	..	..	..	..	2
Pseudo-tuberculosis of precrural gland	..	..	..	..	..	9
Pseudo-tuberculosis of prescapular gland	..	..	..	..	..	25
Pseudo-tuberculosis of mediastinal gland	..	..	..	..	..	2
Pseudo-tuberculosis of scrotal gland	..	..	..	..	..	1
Pseudo-tuberculosis of sup. inguinal gland	..	..	..	..	..	1
Pseudo-tuberculosis of unspecified sites	..	..	..	..	..	87
Total	..	..	..	..	..	127
Abscesses	..	..	..	..	..	4
Abscesses—Liver	..	..	..	..	..	4

SHEEP—continued.

Infectious and Microbic Conditions—continued—

Abscesses—Head muscles	1
Abscesses—due to grass seeds—head and tongue	1
Gastro-enteritis	5
Pyrexia	57
Septicaemia, due to bruising	1
Septicaemia with jaundice	6
Peritonitis	1
Septic metritis with dead fœtus	1

Various—

Liver, cirrhosis	16
Liver, melanosis	522
Liver, fatty, with or without congestion	227
Liver, congestion	192
Liver, congestion, and lungs, congestion	1
Liver, necrotic foci	58
Gall-stones	1
Kidneys, congestion	2
Kidneys, cystic, due to calculus	1
Renal calculus	1
Fibrosis of mamma	1
Dermoid cyst, throat	1
Dropsy	1
Angiomata	1
Bruising	22
Emaciation	23
Suffocation	2
Pregnancy with fever	14
Lambs, immaturity and emaciation	9

LOCALITIES OF DISEASED ANIMALS.

Hydatids—

Eastern States	696
Midland District	42
Williams District	44

Fluke—

Eastern States	1,081
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Pseudo-tuberculosis—

Eastern States	36
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Balbiana—

Eastern States	4
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Melanosis—

Gascoyne District	16
Murchison	28
Midland District	40

PIGS.

Number of Pigs slaughtered, 9,336.

Number with pathological lesions, 1,393.

Tuberculosis—

Generalised	5
Submaxillary or head glands	52
Submaxillary or head glands and lungs	2
Submaxillary or head glands and lungs and pleura	1
Submaxillary or head glands and lungs and intestine	1
Submaxillary or head glands and lungs, liver, and mesentary	1
Submaxillary or head glands, liver, mesentary, inguinal and renal glands	1
Submaxillary or head glands, lungs, and sup. inguinal glands	1

PIGS—continued.

Tuberculosis—continued—

Submaxillary or head glands and spleen	..	..	..	1
Submaxillary or head glands and liver	2
Liver	2
Liver and spleen	1

Total	70
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<i>Swine fever</i>	155
<i>Pyæmia</i>	1
<i>Broncho-pneumonia</i>	33
<i>Broncho-pneumonia and peritonitis</i>	1
<i>Broncho-pneumonia and necrotic foci in liver</i>	..	..	..	2
<i>Purulent pneumonia</i>	..	..	..	1
<i>Pleuritic and peritoneal adhesions</i>	..	..	..	1

Abscesses—

Unspecified	..	..	..	9
Head	..	..	..	9
Mammary gland	..	..	..	1
Thoracic wall	..	..	..	1
Lung and pleura	..	..	..	1
Inf. maxilla	..	..	..	1
Scrotum	..	..	..	1
Flank, shoulder, or ribs	..	..	..	4
Muscles of cheek and hind limbs	..	..	..	1

Hydatids—

Lungs	..	..	..	14
Liver	..	..	..	133
Lungs and liver	..	..	..	16
Lungs, liver, and spleen	2
Spleen	2
Unspecified	665

<i>Cysticercus tenuicollis</i>	56
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<i>Strongylus paradoxus in lungs</i>	100
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Various—

Congestion of lung	1
Cirrhosis of liver	36
Fatty liver	3
Congested liver	7
Necrotic foci in liver	..	..	..	46
Atrophy of kidney	..	..	..	1
Cystic kidneys	..	..	..	14
Renal calculus and atrophy of kidney	..	..	..	2
Melanosis of skin and lung	..	..	..	1
Melanotic pigmentation of skin, fatty deposit in pancreas	..	..	..	1
Emaciation	..	..	..	1

LOCALITIES OF DISEASED ANIMALS.

Tuberculosis—

Northam, Beverley, and Newcastle Districts	..	..	42
Fremantle District	..	..	5
Kalgoorlie District	..	..	2

Swine Fever—

Northam and Newcastle Districts	..	..	102
Fremantle District	..	..	33

Hydatids—

Northam District	..	..	6
Fremantle District	..	..	3

TRYPANOSOMIASIS AND OTHER DISEASES IN CAMELS, WITH EXPERIMENTS IN CONNECTION WITH THE FORMER.

By J. BURTON CLELAND, M.D., Ch. M. (Syd.), Government Bacteriologist and Pathologist, West Australia.

PART II.

INFECTED CAMELS.

No. 8.

Camel 319.—Found on October 5th, during second blood examination with trypanosomes which were easily found.

October 8th.—T. 97.7. No trypanosomes seen.

October 9th.—T. 96.3. " "

October 10th.—T. 95.4. " "

October 11th.—T. 98.4.

October 12th.—T. 98.4.

October 13th to November 12th.—T. normal.

October 14th.—No trypanosomes.

November 13th.—T. 104.5.

Normal then to November 28th, when T. was 103.5.

December 2nd.—T. 102.1.

December 12th.—Destroyed. Very fine animal. Only change seen *post mortem* was a slightly enlarged spleen. Two hydatid cysts in liver.

No. 9.

Camel 95.—Destroyed October 23rd.

Mr. Giles's Notes:—Trypanosomes numerous on previous day, though few to-day (T. 102 deg.). Body generally dark purplish crimson. Spleen much enlarged and very dark. Liver enlarged, very dark; firm; no cysts. Lungs congested; one hydatid cyst. Heart firm, with dark blood. Kidneys normal. Intestines, very slight ulceration; small intestines inflamed; oedematous; no general oedema. Eyes with very slight sticky greenish discharge.

INOCULATED ANIMALS.

Horse No. 1 (Brown).—On August 16th, about 6 c.c. of blood were taken in a small amount of citrate solution from the superficial abdominal vein of Camel 269 at a time when fever and numerous trypanosomes were present. This was injected with aseptic precautions into the lax subcutaneous tissues



North-West Scenes.

1. Boabab Tree and Water Supply, Derby.
2. Station Party leaving Derby.
3. 1,360 bales of Wool, Derby Jetty.

near the axilla. No trypanosomes were seen in the horse's blood. The horse was in poor condition, but otherwise healthy.

August 16th.—T. 99.4.

August 17th.—T. 100.

August 19th.—T. 99.9.

August 21st (5th day).—T. 103.6. Trypanosomes numerous. Very fine specimens.

August 22nd.—T. 102.6

August 23rd.—T. 101.1. No trypanosomes seen.

August 24th.—T. 99.1. " "

August 25th.—T. 98.1.

August 26th.—T. 98.5. No trypanosomes seen.

August 27th.—T. 100.8.

August 28th (12th day).—T. 104.4 Trypanosomes easily found, sometimes two in a field. Coat staring, head down, seems ill.

August 29th.—T. 99.8. Seems better.

August 30th.—T. 99.8. No trypanosomes seen.

August 31st.—T. 99.8.

September 1st.—T. 100.1.

September 2nd.—T. 104.2.

September 3rd.—T. 102.6.

September 4th.—T. 100.2.

September 7th.—T. 103.3. Trypanosomes numerous.

September 8th.—T. 103.6. Sheath somewhat œdematous. Mucopurulent discharge from left eye. Drops hind legs somewhat. Getting decidedly poorer, but this undoubtedly partly due to the difficulty in finding sufficient food in this kind of country.

September 9th.—T. 105.3.

September 11th.—No trypanosomes seen.

September 13th.—T. 103.

September 14th.—T. 104.5. Trypanosomes numerous.

September 16 (30th day).—T. 101.9. No trypanosomes seen in blood.

As food and water were getting scarce for the horses, and it was becoming increasingly difficult to keep them apart from others, this one and horse two were to-day shot. Their condition was so poor that in any case death would have occurred in a week or so from the combined effects of the poor country and the trypanosome infection.

Post-mortem.—Much emaciated. Slight icteric tinge of connective tissues. Liver, lungs and kidneys seem normal. Spleen perhaps a little large. Splenic glands slightly enlarged. Stomach: A large mass the size of a cricket ball was attached to the fundus, on incision yielding pus and small masses of small nematodes; thread worms present in stomach, superficial ulcers round pylorus and slight ulceration, and petechial lines on the fundus (? due to the worms or to the trypanosome infection). Bone-marrow of femur reddish. Tapeworm in small intestine; round worms in colon. Smears were made from the liver, spleen and femur, but no trypanosomes or suggestive bodies were seen.

Paraffin sections of the liver stained with Leishman, and eosin-azure showed no bodies like trypanosomes. Similarly in the spleen no bodies like trypanosomes or their nuclei were seen; there was much blood pigment and scattered eosinophile cells.

Horse No. 2 (Bay).—On August 16th, injected with about 6 c.c. of blood from Camel 11 as in case of Horse 1. Trypanosomes were found in the camel at this time fairly easily. There were none in the horse. The horse was poor, but otherwise well.

August 16th.—T. 100.

August 17th.—T. 99.8.

August 19th.—T. 98.2.

August 21st.—T. 100.5. No trypanosomes seen.

August 22nd.—T. 101.6.

August 23rd.—T. 100.8. No trypanosomes seen.

Augusts 24th.—T. 102.4 " "

August 25th.—T. 101.8.

August 26th (10th day).—T. 100.1. One trypanosome seen in 5 minutes search.

August 27th.—T. 102.7.

August 28th.—T. 100.2. Trypanosomes easily found, sometimes two in a field, but some seem small (? from blood clotting), and some swollen and degenerated.

August 29th.—T. 100.4.

August 30th.—T. 100.2. Trypanosomes easily found.

August 31st.—T. 100.2.

September 1st.—T. 100.2.

September 2nd.—T. 102. No trypanosomes seen.

September 3rd.—T. 100.8.

September 4th.—T. 101.1.

September 7th.—T. 101.2. No trypanosomes seen.

September 8th.—T. 103.2.

September 9th.—T. 103.6.

September 11th.—No trypanosomes seen.

September 13th.—T. 102.1. Drags hind legs, getting very thin.

September 14th.—T. 102.3.—No trypanosomes.

September 16th.—T. 102.8. Shot.

Post-mortem.—Much emaciated. Slight but distinct icteric tinge. Spleen perhaps slightly soft. Numerous small abscess cavities size of almonds in liver with curdy pus, evidently a secondary infection from a mass attached to the stomach, consisting of cavities containing pus and minute nematodes (*Spiroptera microstoma*) in dense fibrous tissue. No ulceration of stomach. Round worms in colon. No petechiæ. Marrow of femur red.

Smears from the liver abscesses showed numerous streptococci often in long chains. No trypanosomes or suggestive bodies were detected in films from the liver, spleen, splenic glands or femur.

Paraffin sections of the liver showed in places plasma cells with leucocytes, but nothing like trypanosomes.

Horse No. 3 (White).—On August 18th, injected with about 6 c.c. of blood from Camel 106, as in Horses 1 and 2. Trypanosomes were few in the

camel, none were found in the horse. The horse was in poor condition and heavily scouring.

August 21st.—T. 97.5.

August 19th.—T. 94.8.

August 21st.—T. 96.5.

August 22nd.—T. 102.6.

August 23rd.—T. 102.6. No trypanosomes seen.

August 24th (17th day.)—T. 104.2. One trypanosome seen in 5 minutes search.

August 25th.—T. 98.2 No trypanosome seen in 5 minutes search.

August 27th.—T. 97.2.

August 28th.—T. 98.7.

August 29th.—T. 97 " " " (very

hard to get blood for film).

August 30th (12th day).—One or two trypanosomes per field.

Horse No. 4 (Chestnut).—On August 16th, a *Hippobosca Camelina* (Camel Fly) caught around the three infected camels about noon, was allowed to bite this horse for five minutes about 4 p.m. The horse jumped several times, so was evidently bitten. The fly was dead next day. There were no trypanosomes in the horse.

On August 18th, two *H. Camelina* were allowed to bite Camel 269 at a time when many trypanosomes were present in the blood. Five hours later they were allowed to bite the horse and draw blood.

On August 20th another fly bit Camel 106 and two hours later bit the horse.

On August 27th a fly was allowed to bite Camel 269 with numerous trypanosomes (4 to 5 in a field), and immediately afterwards the horse.

On the following dates the blood was examined, but no trypanosomes were seen. August 23rd, 24th, 27th, 28th, 29th, 30th, and September 2nd, 6th, 8th, 11th, 14th, 15th, 18th, 25th, and October 1st. During all this period, the temperature varied between 97.3 and 101.8 being taken on 28 occasions. At this stage it was considered that the experiment had been unsuccessful.

On September 28th this horse was used in Series 9 of the Test Inoculations, blood from Camels 112 to 126 being injected, about .5 c.c. from each in citrate solution. It was necessary to use this animal, as so few others were procurable.

No trypanosomes were seen on October 1st, 3rd, 4th, and 5th. On the 7th a very doubtful parasite was seen. The temperature hitherto had been normal, but rose to 103 on the 8th. On this date and on the 10th, 11th, and 12th no trypanosomes were seen, the temperature having again fallen to normal on the last three occasions.

October 13th.—T. 106.3.

October 14th.—Trypanosomes fairly numerous.

October 23rd.—Shot. Trypanosomes numerous two days before, but very hard to distinguish at *post-mortem*. Very little change beyond pooriness at *post-mortem*. No ulceration of intestines, no jaundice, etc. Slight thickening of one end of spleen. Evidently an old healed wound (spear or bullet) through liver, lungs, and diaphragm, leaving a hole through the latter.

Horse No. 5 (Bay, the "Hatter").—Used on September 27th in Series 7 of the Test Inoculations, receiving about .5 c.c. from each of the Camels 88 to 101.

No trypanosomes seen on September 27th, October 1st, 2nd, 3rd, 4th, 5th, 6th, and no rise of temperature.

October 7th.—T. 103. One dividing trypanosome seen.

October 8th.—T. 104.5. Trypanosomes numerous.

October 9th.—T. 102.2 Trypanosomes seem less numerous.

October 10th.—T. 107.4. Only one trypanosome seen in several fields.

October 11th.—T. 99.6.

October 12th.—T. 101.2.

October 13th.—T. 99.9.

October 14th.—Trypanosomes numerous.

October 15th.—Destroyed. Poor, but practically normal. Spleen slightly enlarged at large end. Lungs slightly congested. Heart flabby. Liver, kidneys, brain, normal. No ulceration of stomach or intestine. Slight œdema (? poor condition).

The infection was traced to Camel 95.

Dog No. 1.—On August 2nd several c.c. of blood were collected in 1 per cent. sodium citrate in normal saline solution by means of an incision into the tip of the tail of Camel 11 after washing and sterilising. This emulsion was injected into the subcutaneous abdominal tissues of the dog. The camel at this time showed about 1 trypanosome in 5 minutes search through a blood film.

August 5th.—No trypanosomes seen in dog.

August 8th.—" " "

August 12th (10th day).—T. 103.3. No trypanosomes seen.

August 13th.—T. 103.8. Slide not made.

August 14th (12th day).—One somewhat doubtful trypanosome seen after long search.

August 15th.—T. 102.5. One definite trypanosome seen.

August 16th.—T. 101.4.

August 17th.—T. 104. Trypanosomes easily seen, sometimes two together.

August 19th (17th day).—T. 102.3. Trypanosomes in dog seem fewer, and some look swollen and degenerated.

August 20th.—T. 104.2. About this date, dog vomited twice.

August 21st.—T. 103.6. No trypanosomes seen.

August 23rd.—T. 101.7. " "

August 24th.—T. 101.8. Dog followed a trap for about 10 miles and was away for two days. Seemed well on his return; in fact, the only symptom so far, in addition to vomiting twice, was a slight somewhat doubtful puffiness around the eyes about August 14th.

August 27th (25th day).—T. 101. One degenerated trypanosome seen.

August 28th.—T. 102.2.

August 29th.—T. 104.

August 30th (28th day).—T. 102.7. Trypanosomes easily found. Seems well.

August 31.—Ran part of the way to Poondina (40 miles) with the buggy. Seemed well and lively on starting, but got tired during the heat of the day and so was carried.

September 1st.—Twenty miles into Port Hedland, carried part of the way.

September 2nd to 5th.—In Port Hedland tied up. Eat well. On latter date returned to Poondina, and next day the 40 miles to camp. Seemed well, and ran well, carried part of way.

Dog No. 2, Scottie.—On October 7th, blood obtained from the tail of Camel 269 and collected in citrate solution, was injected into the abdominal subcutaneous tissues of Dog 2. At this time the camel showed occasional trypanosomes, requiring about a minute's search to find one.

August 12th.—No trypanosomes seen. T. 102.2.

August 15th.—T. 102.6.

August 16th.—T. 101.7.

August 17th.—No trypanosomes seen. T. 102.1.

August 19th (12th day).—Trypanosomes present, several seen in 5 minutes. T. 104.3.

August 20th.—T. 104.6. No trypanosomes seen now.

August 21st.—T. 103.5.

August 23rd.—T. 101.4. No trypanosomes seen.

August 24th.—T. 100.4.

August 27th (20th day).—T. 101.9. One dividing trypanosome seen.

August 28th.—T. 105.1.

August 29th.—T. 101.8.

August 30th.—T. 100. No trypanosomes seen.

Trypanosomes present: few on November 1st, 8th, 11th, 17th. November 8th sick. Getting œdematous on back. November 13th very sick and low. Died November 21st. Very emaciated; œdematous on the head, back and genitals. The organs were forwarded to me and paraffin sections were cut and stained with iron hæmat oxylin, giemsa, etc. Liver—the cells were widely separated in columns by interstitial fibrosis and dilated capillaries. There were numerous rosettes of needle-like crystals like those of tyrosin; large bacilli were scattered through the organ; no bodies like trypanosomes seen in this or any other organ. Pancreas and spleen, nothing special, kidney, *nil*, except large bacilli. The eye which during life had an opacity, was infiltrated with large cells, many containing melanin.

Mr. Gile's notes towards the end are:—Conscious up till last. Death preceded by all the symptoms usually observed including œdematous swellings of the head, viz., eyes, nostrils, and lips, also the genitals. The testicles were very hard and swollen. The eyes and nostrils exuded a thick greenish matter. Post-mortem reveals a soft heart, lungs in a very bad state, discoloured, and slightly congested. Liver much enlarged and pale, gall bladder empty. Spleen much enlarged, pale and soft. Kidneys enlarged with yellowish spots on them. Intestines very discoloured, on opening ulcerated and bloody mucus throughout, but inflammation very slight in small intestines. Body anaemic and jaundiced throughout, scarcely any fat left. Blood smears taken 4 hours before death (T. 97.2) showed no trypanosomes, only degenerated forms. The last motion an hour before death was a sudden sharp discharge of thick black fluid ejected about a foot from anus. Paresis of hind quarters preceded death by 7 or 8 hours. Hair all loose, and some discharge all along back, at root of tail and penis. Trypanosomes last found in fair numbers on November 17th, T. 101.2.

Dog No. 3 (Blackie).—On August 9th, Cow Camel 106 was tied down, and four or five c.c. of blood were taken directly from the longitudinal abdo-

minal vein and and injected without citrate solution into the abdominal subcutaneous tissue of dog 3. Trypanosomes were found in the camel at this time after about a minute's search.

August 13th.—T. 101.2.

August 15th.—T. 103.2.

August 16.—T. 100.2.

August 19th (10th day).—T. 102.2. Trypanosomes present, about two in five minutes.

August 20th.—T. 102.4.

August 21st (12th day).—T. 104.4. Trypanosomes numerous.

August 23rd.—T. 101.1. Trypanosomes disappeared.

August 24th.—T. 101.8.

August 27th.—T. 101.7.—Trypanosomes fairly numerous, some swollen, degenerated and staining poorly.

August 28th.—T. 105.8.

August 29th.—T. 101.5.

August 30th.—T. 98.5. No trypanosomes seen. Dog's coat good, seems in excellent condition.

Between August 31st and September 6th, this dog accompanied me into Port Hedland and out again (60 miles each way), running part of the way and being carried part. He showed no special fatigue, and looked well on it.

October 15th.—Partially paralysed in hindquarters in morning, but got better. Undoubtedly affected. T. 105. No trypanosomes.

November 8th.—Very low and mopy.

November 11th.—High T. No trypanosomes.

November 13th.—Better.

November 19th.—A few trypanosomes.

November 22nd.—Livelier.

November 25th.—A few trypanosomes.

November 29th.—Getting œdematous over neck and tail.

January 16th, 1908.—No trypanosomes.

January 18th, 1908.—No trypanosomes. Killed. Paraffin sections of liver and spleen showed no definite trypanosomes. In the latter were a few cells with a clear nucleus-like part in which one or two red dots (Leishman's stain) were seen.

Dog No. 4 (Dachshund).—On August 16th, one or two c.c. of blood were taken in a small quantity of citrate solution from the longitudinal belly vein of Camel 269, and injected into the abdominal subcutaneous tissue of the dog. The camel at this time exhibited high fever with numerous trypanosomes in its blood. Dog's T. 102.3.

August 19th.—T. 104.5.

August 20.—T. 103.7.

August 21st.—T. 102.5. No trypanosomes seen.

August 23rd.—T. 101.5.

" "

August 24th (8th day).—T. 103.5. One trypanosome seen in five minutes.

On the 25th this dog accompanied a buggy for 10 miles and was away for two days. It seemed none the worse on its return.

August 27th.—T. 103.2. Trypanosomes very numerous, sometimes 7 or 8 in a field. Vomited frothy mucus and food to-day.

August 28th.—T. 103.6.

August 29th.—T. 102.

August 30th.—T. 101.1. No trypanosomes seen.

From August 31st to September 5th accompanied me to Port Hedland and back, running part of the way. Vomited on the way in. On return seemed well and none the worse.

Dog No. 5, Pug.—On August 2nd about eight drops of blood were collected in citrate solution from the tails of camels 3, 14, 36, and 103, and injected into the pug. No trypanosomes were found in these camels.

The blood was examined on the following dates with negative results:—August 5th, 8th, 12th, 17th, 19th, 21st, 23rd, 27th, 29th, and 30th. The animal was later used for further inoculations.

Dog No. 6, Punch.—On August 17th two Hippoboscæ Camelina (Camel Flies) were allowed to feed on Camel 269 when many trypanosomes were present. Twenty-two hours later (August 18th) they were allowed to bite the dog.

On August 19th two flies bit Camel 269 and four hours later the dog.

No trypanosomes were seen on August 27th, 29th, 30th, and on September 8th, 13th.

Dog No. 7 (Forty-two Sheep Dog).—Used on September 12th, in Series 3 of Test Inoculation receiving about .5 c.c. blood from Camels 22 to 38. No trypanosomes seen on 13 occasions between September 13th and October 3rd. On September 19th, the T. rose to 103.6, but fell again next day. (This was a very hot day, and the dog, a long-haired one, had been running about. In the evening its T. was just above normal). For the rest of the time not above 101.

Owing to the shortage of inoculation animals, it was used again on September 28th for Series 10, receiving blood from Camels 127 to 137.

October 11th.—One trypanosome seen (13th day after last inoculation), T. 100.

October 12th.—Several trypanosomes easily found. Mostly swollen and degenerated. T. only 100.8

Infection traced to camel 132 (No. 7 of Infected Camels).

Guinea-pig No. 1 (Brown).—On August 2nd inoculated in the abdominal subcutaneous tissue with a small quantity of blood (much less than one c.c.) obtained from the tail of Camel 11 and collected in citrate solution. At this time the camel showed occasional trypanosomes, about one in five minutes' search.

Its blood was examined on the following days August 8th, 12th, 16th, 19th, 21st, 24th, 28th, and 30th. During these 28 days no trypanosomes were seen on the eight occasions on which slides were made. It is possible they were present on some of the intermediate days, and had disappeared again. This animal showed no sign of sickness.

Guinea Pig No. 2 (White and Yellow).—On August 7th, injected into the abdominal subcutaneous tissue with blood from the tail of Camel 269

collected in citrate solution. Less than one c.c. of blood was used. The camel had occasional trypanosomes.

On August 12th, 16th, and 19th no trypanosomes were seen.

August 22nd (15th day).—Trypanosomes easily found.

August 24th.—No trypanosomes seen.

August 28th.—Several swollen and degenerated trypanosomes found.

August 30th.—No trypanosomes seen. Animal seems well.

Guinea Pig No. 3.—On August 9th, one to two c.c. of blood were taken directly from the superficial abdominal vein of Camel 106 and injected into the abdominal subcutaneous tissue. Occasional trypanosomes only were present in the camel.

No trypanosomes were seen on August 12th, 16th, 19th, 22nd, or 24th.

On August 28th (19th day) trypanosomes were numerous, sometimes two in a field.

August 30th.—None seen.

Guinea Pig No. 4 (Large Sow).—On August 16th, interjected with 1 to 2 c.c. of blood taken from the superficial abdominal vein of Camel 269 and collected in a very small amount of citrate solution. The camel had high fever with numerous trypanosomes. No trypanosomes were seen on August 20th, 23rd, 27th, 29th, and 30th, and on September 3rd.

Guinea Pig No. 5.—On August 5th, inoculated subcutaneously with blood from the tails of camels 8, 16, 30, and 49. About $\frac{1}{4}$ c.c. from each collected in citrate solution. Slides from these camels were all negative.

On August 12th and 16th, no trypanosomes were seen.

On August 18th, the animal was found dead. *Rigor mortis* had not set in. The subcutaneous tissue seemed oedematous, but apart from this, all organs seemed normal. Films from the veins of the neck and thorax and from the spleen and liver showed no trypanosomes.

Death can only be attributed to outside causes.

Guinea Pig No. 6.—On August 14th, inoculated as guinea pig 5 from camels 228, 297, 462. There was slight clotting of the blood in the citrate solution. The camels were all negative.

No trypanosomes were seen on August 20th, 23rd, 27th, 29th and 30th, and on September 3rd.

Guinea-pig No. 7.—On August 17th, inoculated as in guinea-pig 5 from camels 358, 365, 424—all negative.

No trypanosomes were seen on August 23rd, 27th, 29th, and 30th, and September 3rd.

At the beginning of October, a very minute quantity of blood from a camel swarming with trypanosomes was injected subcutaneously. This was to see whether a very small quantity was infective. No trypanosomes were seen though searched for many times. However, the animal sank gradually, and died on November 21st. Was very anaemic and the heart was gorged with dark coagulated blood. Lungs discoloured. Liver, soft and pale. Spleen, very soft and diffuent. Intestines green and ulcerated. Bloody mucus around anus. Hair loose, no oedema, but severely jaundiced. No trypanosomes seen in smears.

Rats Nos. 1 and 2.—On August 7th inoculated with a small amount of blood collected in citrate solution from the tail of camel 269 at a time when trypanosomes were few. The inoculations were into the subcutaneous tissues of the thigh.

No trypanosomes were seen on August 12th or 14th.

Between August 16th and 18th, the rats were seen to be thinner, with eyes only half-open and apparently swollen, and they were hardly able to move. This condition appeared due to the heat of noon-day as they soon recovered on being removed to a cooler spot. No trypanosomes were seen on the 18th after long search.

None were seen also on August 20th, 23rd, 26th, or 29th.

Rat No. 3.—On August 9th, blood was taken directly from the abdominal vein of camel 106, and injected into rat 3. There were no *T. Lewisi* in this rat.

On August 12th, 14th, 19th, and 22nd, trypanosomes were searched for but none found. On August 26th, two definite but degenerated trypanosomes were found and one good one was seen on the 30th. None were found on 10th September.

Rat No. 4.—On August 16th, blood was taken directly from the abdominal vein of camel 269 (when trypanosomes were numerous) and injected, with a minimum of citrate solution, into this rat.

No trypanosomes were seen on August 19th, 22nd, 26th, 29th, and 30th, or on September 10th.

Rat No. 5.—On August 19th, blood from the tails of camels 28, 45, and 466 (all showing absence of trypanosomes in blood slides) was injected, after collection in citrate solution, into this rat.

No trypanosomes were seen on August 26th and 30th or on September 10th.

ORCHARD PESTS.

Trapping the Curculio Beetle.

Mr. T. Hooper, Chief Inspector of Orchards, reports that, together with Inspector Wickens, he has recently made a tour of inspection of orchards at Bridgetown, Dingup, Riverside, Deeside, Perup, and Balbarrup. He states :—"I found the orchards well sprayed with lime, sulphur, salt, and aphistine—1 in 10. Scarcely any live scale were found during the whole trip, but peach leaf curl was severe on some trees. The *Curculio Beetle* (*Otiorynchus Cribricollis*) is again very destructive. The best system of trapping these I saw at Mrs. T. Gibblett's, Dingup. It consisted of tying a band of sacking around the trees and folding it upwards, instead of downwards, as for codlin moth. The beetles feed in the night on the trees and crawl down into these shelters in the day-time, then one can go through the orchard and by pressing the bands, destroy large numbers of the pest.

The fruit in this district is setting remarkably well, and, no doubt, under favourable conditions, there will be a bumper crop. There is a large area of land suitable for orchards, but most of it is very heavily timbered."

NAMBAN CREEK PHOSPHATES.

REPORT BY THE GOVERNMENT ANALYST.

The following report has been furnished by Mr. E. A. Mann, Government Analyst, upon samples of the phosphatic deposits recently discovered in the Namban Creek district by Mr. E. Goczal :—

"The samples were very wet when received, and had to be partially dried before they could be analysed. The figures given below, therefore, represent a higher proportion of phosphoric acid than actually occurs in the original samples, but as the deposit would readily become air dried on working they represent what would be an average content of the manure when bagged. The following are the results of the analysis :—

Cave 2.

	No. 1.	No. 2.	No. 3.
Moisture	3.51	1.28	2.31
Phosphoric acid (water soluble) ..	.42	.32	.34
Phosphoric acid (citrate soluble) ..	18.32	10.12	13.04
Phosphoric acid (acid soluble) ..	1.98	1.74	2.02
Total	20.72	12.18	15.40
Equal to Phosphate lime	45.25	26.60	33.63
Nitrogen .. .. .	.43	.42	.2

Cave 3.

	No. 1.	No. 2.
Moisture	5.19	11.29
Phosphoric acid (water soluble) .. ..	.74	.74
Phosphoric acid (citrate soluble)	10.13	14.57
Phosphoric acid (acid soluble)	7.23	4.55
Total	18.10	19.86
Equal to Phosphate of lime	39.53	44.07
Nitrogen	1.57	1.65

"In order to determine the value of these deposits as fertilisers, the most reliable method is to work out their unit values based on the following table, which has been drawn up from the prices and analyses of fertilisers on the market :—

Ingredient.	Value per unit. s. d.
Nitrogen (in organic matter)	13 0
Phosphoric acid (water soluble)	6 2
Phosphoric acid (citrate soluble)	3 6
Phosphoric acid (acid soluble)	3 3



Pure Bred Yearling Ayrshire Bulls bred at the State Dairy Farm, Brunswick.

"By reducing any fertilisers to their unit values, a direct means of comparison is obtained. Worked out on this basis, the samples of cave guanos whose analyses are given would have the above unit values.

Cave 2.—No. 1, £3 18s. 3d. ; No. 2, £2 8s. 3d. ; No. 3, £2 16s. 7d.

Cave 3.—No. 1, £4 2s. 1d. ; No. 2, £4 12s. 8d.

"In order that these may be compared with other fertilisers, I give the analyses of Abrolhos guano, superphosphates, bone-dust, and Thomas's phosphate. Thomas's phosphate, however, is a special case over which some confusion appears to have arisen in connection with the reports which have been published concerning these guanos. The phosphoric acid in Thomas's phosphate is in a special form not represented in any other of the manures imported. It is, consequently, spoken of as citrate soluble phosphoric acid, but it is not really the same as the citrate soluble phosphoric acid in superphosphate or bone meal, and has a higher value, approaching more nearly to that of water soluble phosphoric acid ; in fact, on some of our light sandy lands, deficient in lime, it may be considered as valuable as superphosphate. The unit value of phosphoric acid in slag should be somewhere about 4s. 6d., and Thomas's phosphate is worth from £3 15s. to £4 per ton. The analyses of the four manures mentioned, with their unit values, would, therefore, work out as follows :—

		Mt. Lyell super.	Bonedust.	Abrolhos guano.	Thomas's phosphate
Phos. acid—					
Water sol.	.. ..	19.04	..	5.06	
Citrate sol.	.. ..	..	5.1	..	
Acid sol.	.. ..	1.48	18.74	12.55	
Total	.. ..	20.52	23.84	17.61	17.00
Nitrogen	.. ..	..	4.6	1.85	
Unit Values.					
Phos. acid—	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
Water sol.	.. .. 4 18 4	..	..	..
Citrate sol.	.. .. ..	0 17 10	0 17 9		
Acid sol.	.. .. 0 4 10	3 0 9	2 0 9		
Nitrogen	.. .. ..	2 9 9	1 4 6		
	£5 3 2	£6 8 4	£4 3 0	£3 16 5	

"The cave deposits, viewed in this light, in comparison with other fertilisers, would seem to be of considerable value, especially those from Cave 3, which approach more nearly an ordinary guano. There seems to be no doubt that these are guano deposits of some considerable age, and that they would be of use for direct fertilisation of the land, but they are of too low grade for the manufacture of superphosphate. Their rapidity of action and value could be best gauged by comparison with Abrolhos guano. There seems to be considerable variation in the value of the samples submitted to me, and I would recommend that, say, 100 tons be raised and sampled in a systematic manner, so as to arrive at a definite idea of the average composition of the deposit. Some misapprehension seems to have been caused by comparing these deposits with Thomas's phosphate. As I have pointed out, the phosphoric acid in Thomas's phosphate is a totally different form and with equal quantity of phosphoric acid Thomas's phosphate must be

considered the more valuable of the two. The unit values take into account as far as possible all the variations of solubility and composition of the various fertilisers, and endeavour to bring them down to one common basis, on which they can be compared, namely, money values, and it was incorrect to state that in these cave deposits we have manures equal to Thomas's phosphate if their unit value only amount to about £2 10s. per ton, where the unit value of Thomas's phosphate amounts to about £4 per ton. Some of these latter samples, however, which have just been analysed, show a highly increased value, and are more closely approaching to the value of Thomas's phosphate."

POULTRY NOTES.

By FRANK H. ROBERTSON.

Particulars are to hand of an interesting test now being held at the College Poultry Farm, England, with reference to the laying qualities of English, American, and Danish Leghorns. The test is being conducted for 12 months, and some results have been obtained for the first six months, in which the large English heavy type of Show White Leghorn compares very badly with the light active Danish and American birds, both as regards number and weight of eggs.

Australian poultry-keepers have of late years adopted the smaller type of Leghorn as the best type for egg production, and in this State at the present time the big English birds are becoming quite scarce, there were plenty of them to be found five years ago, and it is remarkable how quickly any breed or type of poultry can go out of vogue, and be replaced by something different.

The following is a copy of the Report taken from the *Feathered World*. It will be noticed that the Danish Leghorns are highly spoken of, particularly as regards size of egg. The introduction of stock birds from that part of the world would be worth consideration by any of our breeders who contemplate importing fresh blood :—

With a view to giving a practical test to the laying qualities of these different types, an experiment is being carried out on the College Poultry Farm, Theale, commencing on January 1st last, and the present is the report of the results obtained during the six months ending June 30th. None of the birds, however, commenced to lay until February, due to the pullets being somewhat late hatched.

Birds.—For the purpose of this experiment the following birds were placed in separate runs on the college poultry farm, and were used for breeding purposes :—

1. Nine Danish brown Leghorn 1907 pullets selected from one of the best breeding centres in Denmark. Two of the hens died as a result of being egg-bound, and their eggs are not calculated.

2. Fifteen Danish white Leghorn 1907 pullets selected from two breeding centres in Denmark.

3. Twelve Danish white Leghorn 1906 hens, selected as above.

4. Four American white Leghorn 1906 hens, imported from Lakewood Poultry Farm, in the State of New Jersey.

5. Four English exhibition white Leghorn hens, purchased for this purpose from one of the best breeders in this country. They are heavier in leg than the pure Leghorn, but are not of the extreme exhibition type.

The hens and the brown Leghorn pullets were used for breeding, and fertility was very high. From these upwards of a thousand chickens have been hatched.

Size of Birds.—Increased size of body leads to decrease of egg production, and therefore we find that the heaviest layers are generally small. It is interesting to note the average weights of the birds on January 1st last, when the experiment commenced:—

Lot No.	Breeds.	Average weight.	
		lbs.	ozs.
1 ..	Danish brown Leghorn pullets	3	8
2 ..	Danish white Leghorn pullets	3	4½
3 ..	Danish white Leghorn hens	3	3¼
4 ..	American white Leghorn hens	3	9
5 ..	English (exhibition) white Leghorn hens ..	5	0

Thus it will be seen that the English are more than 50 per cent. larger than the Danish, and are nearly 40 per cent. heavier than the American.

Egg Production.—With a breed like the Leghorn, results in egg production are the supreme test, both as to number and marketability. The birds were carefully trap-nested, and the records kept day by day. The following are the results for six months:—

Lot No.	Breeds.	No.	Total No.		Average
			of eggs.	per hen.	
1	Danish brown Leghorn pullets ..	7	686	98.0	
2	Danish white Leghorn pullets ..	15	1,217	81.13	
3	Danish white Leghorn hens ..	12	1,053	87.75	
4	American white Leghorn hens ..	4	530	82.5	
5	English (exh.) white Leghorn hens ..	4	143	35.75	

Several of the Danish browns and whites exceeded 100 eggs, the highest of the American was 88, and that of the English 36. These figures are only for half a year, but, as the experiment is being continued, we shall report the annual result after December 31st next.

It is not suggested that No. 5 represents in any sense the production of true English white Leghorns bred for utility purposes, many of which would equal the Danish, but it is indicative of the results of the effect produced by changing the character of this fowl for exhibition.

Size of Eggs.—What is of almost equal importance is the size of eggs produced, because for the best trade those of 2ozs. and upwards are a *sine quâ non*. The Danes have paid special attention to this point, and with remarkable success. This is specially important as regards brown Leghorns,

the eggs of which race in this country are much smaller than the whites. The eggs were carefully weighed, and the results were:—

Lot No.	Breeds.	Eggs under 2ozs. in weight.	
		Per cent.	
1	Danish brown Leghorn pullets	1.16	
2	Danish white Leghorn pullets	1.31	
3	Danish white Leghorn hens	1.14	
4	American white Leghorn hens	0.6	
5	English (exh.) white Leghorn hens	34.26	

Thus it will be seen that in the first year the Danish pullets gave high-grade eggs so far as size is concerned, a point which has been neglected in this country too long in striving for number.

The following tables give further particulars of great moment:—

Lot No.	Breeds.	Average weight of eggs laid per bird.		Average weight of eggs.		Weight per 120 eggs.	
		lbs.	ozs.	ozs.	lbs.	ozs.	
1	Danish brown Leghorn pullets ..	12	15.96	2.12	16	0	
2	Danish white Leghorn pullets ..	10	15.14	2.15	16	1	
3	Danish white Leghorn hens ..	11	12.63	2.15	16	1	
4	American white Leghorn hens ..	11	13.53	2.3	17	2	
5	English (exh.) white Leghorn hens	4	9.15	1.96	14	12	

Further observations will be made when the report of the complete experiment is published.

EDWARD BROWN, Lecturer in Aviculture.

WILL BROWN, Practical Instructor in Aviculture.

University College, Reading, July, 1908.

THE VALUE OF THE POULTRY INDUSTRY.

Some interesting figures are to hand as to the value of the poultry industry in this State, as supplied by the Government Statistical Department up to the 31st December, 1907. The total number of poultry is 785,721, made up as follows, viz.:—

Fowls	.. .. .	657,563
Ducks	.. .. .	79,728
Geese	.. .. .	8,956
Turkeys	.. .. .	39,474

785,721

This is the first year in which such full information has been obtained, as in former years no account was taken of landholders of areas of less than one acre, this would of course exclude the vast body of suburban poultry keepers within the Metropolitan area, and as these number 10,700 odd the old returns were incomplete and far short of the actual number of poultry in the State.

The following figures also supplied by the Statistical Department give us the prices poultry of all kinds fetched in the Perth Public Auction Rooms during the same year, viz., 1907:—

	January.			February.			March.			April.		
	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Turkeys—												
Cocks ...	30 0	18 0	25 0	25 0	20 0	21 6	27 6	18 0	23 6	20 0	15 0	18 6
Hens ...	14 0	11 0	12 6				20 0	12 0	15 0	15 6	7 9	10 0
Geese ...	11 0	8 0	9 6	8 0	7 0	7 6	11 0	11 0	11 0	10 0	9 0	9 6
Ducks ...	6 9	3 0	6 0	6 9	4 0	6 6	6 0	3 6	5 0	7 6	3 9	6 0
Fowls ...	6 9	3 6	5 6	7 0	3 6	6 0	6 9	3 6	5 6	6 6	3 9	5 9

	May.			June.			July.			August.		
	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Turkeys—												
Cocks ...	20 0	8 6	15 0	15 0	8 6	12 9	21 0	12 0	15 0	23 6	15 0	19 6
Hens ...	8 6	6 0	8 0	8 9	6 0	8 0	13 0	8 0	11 9	15 0	9 0	12 0
Geese ...	7 6	6 0	7 0	11 0	7 0	8 0	10 6	10 6	10 6	12 0	7 0	11 0
Ducks ...	7 9	4 0	6 0	8 3	4 6	6 6	8 0	5 3	7 0	8 6	5 0	6 9
Fowls ...	6 9	3 9	5 6	7 0	2 0	5 9	7 0	3 0	5 0	7 6	4 0	6 0

	September			October.			November.			December.		
	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Turkeys—												
Cocks ...	23 6	17 0	21 0	23 6	16 0	21 6	21 6	16 0	19 0	40 0	16 0	20 0
Hens ...	16 0	11 0	14 6	15 6	10 0	14 0	14 0	11 0	13 0	18 0	7 6	14 6
Geese ...	13 0	9 0	11 0	10 6	8 0	9 6	10 6	7 0	9 6	11 9	7 6	10 0
Ducks ...	8 9	5 6	7 0	7 9	5 0	6 6	7 3	4 0	5 6	7 9	4 0	6 0
Fowls ...	7 9	3 6	6 0	7 3	4 0	6 0	8 3	3 0	5 6	7 0	3 6	5 6

From this we are enabled to form a fair valuation of the stocks then in hand at the average auction prices, which are as follows, viz.:—Fowls, 5s. 8½d. per pair; ducks, 6s. 2¼d.; geese, 9s. 1d.; turkey gobblers, 20s.; turkey hens, 12s., all per pair; thus making the total values as follows:—

	£
Fowls	93,104
Ducks	12,291
Geese	2,014
Turkeys	15,789

Total value of all poultry £123,198

This estimate is probably rather under than over the mark, both as regards number and value, as Guinea fowls are not mentioned, neither is any account taken of the extra value of pen-bred poultry, which are worth much more than the average auction prices.

The following is the table of prices eggs fetched at auction during 1907:—

				s.	d.	s.	d.
January	1 7	0	10
February	2 0	0	10
March	2 1	1	1
April	2 10	1	3
May	2 9	1	5
June	2 6	1	3
July	1 11	1	6
August	1 9	0	9½
September	1 1	0	9
October	1 0	0	9½
November	1 1½	0	10
December	1 6	0	11

There is a vast disparity between the maximum and the minimum prices which clearly shows that buyers use much discrimination at appraising the qualities of the various lots of eggs submitted. The maximum average works out at 1s. 10d. and the minimum 1s. 0¼d., or an average of 1s. 5d.

It is a most difficult matter to arrive at the value of the annual egg yield, but we will be well within values if we take half the number of ducks and fowls as layers, viz., 368,645, and allow them the small average output of 8 dozen eggs in the 12 months at the average price of 1s. 6d. a dozen, viz., 12s. per bird, this gives an egg yield of £221,187, which added to the value of poultry, gives a grand total of £344,385. These figures pale into insignificance when a comparison is made with the United States of America, as recent figures place the annual values of the industry at the enormous figure of 650 million dollars, equal to 130 million pounds sterling.

THIRD EGG-LAYING COMPETITION AT SUBIACO.

[Commenced July 1, 1908. To close March 31, 1909.]

Appended, herewith, are the results for the new competition which commenced on the 1st July and is to run for nine months, terminating on the 31st March, 1909.

Eggs for sitting from any of the pens are obtainable on application to the Manager at Subiaco; prices range from 10s. 6d. to 21s. per dozen. A price list is forwarded on application, or see the *Journal* for July.

The following are the results up to November 30:—

The figures in black indicate the winner of the monthly prize.

The first column of figures indicates the present position of the pens in the competition.

Pens marked thus * remained in from last competition.

FOWLS.

Six females and one male bird in each pen.

Owner and Breed.	July.	Aug.	Sept.	Oct.	Nov.	Total
1 Mrs. A. S. Craig, Black Orpington ...	131	145	129	146	110	661
2 S. Craig, White Leghorn ...	81	126	133	144	135	619
3 Sunnyhurst (S.A.), White Leghorn ...	109	111	143	143	111	617
4 Mrs. C. F. Schmidt, White Leghorn ...	104	117	127	131	128	607
5 A. H. Padman (S.A.), White Leghorn ...	71	124	146	137	127	605
6 Gaffney & Bach, White Leghorn ...	102	117	128	136	113	596
7 Mrs. Kynaston, White Leghorn ...	91	130	122	139	108	590
8 Mrs. A. E. Kinnear (S.A.), White Leghorn	82	110	136	140	121	589
9 Mrs. L. Mellen, White Leghorn ...	106	126	133	128	92	585



Poor Poor Yearling Ayrshire Bull, State Dairy Farm, Brunswick.

EGG-LAYING COMPETITION—continued.

FOWLS—continued.

Owner and Breed.	July.	Aug.	Sept.	Oct.	Nov.	Total
10 Lionhurst Poultry Farm, Buff Leghorn ...	104	116	121	132	99	572
11 C. Herbert, White Leghorn ...	86	129	133	129	91	568
12 Glendonald Poultry Yard, Silver Wyandotte ...	92	117	120	125	99	562
13 Homebush Farm, White Leghorn ...	80	107	118	135	121	561
14 J. W. Buttsworth, White Leghorn ...	113	133	117	113	78	554
15 T. W. Martin, White Leghorn ...	76	126	131	129	89	551
16 G. Bolger, White Leghorn ...	49	115	138	139	105	546
17 A. M. Thomas, White Leghorn ...	77	133	132	133	70	545
18 T. Ockerby, White Leghorn ...	62	126	116	129	111	544
19 C. B. Bertelsmier (S.A.), White Leghorn ...	94	125	121	121	82	543
20 Greenville Poultry Farm, White Leghorn ...	97	114	127	118	87	543
21 E. Garbett, White Leghorn ...	71	129	120	120	85	525
22 Shamrock Poultry Farm, White Leghorn ...	82	99	133	131	78	523
23 J. Gaffney, White Leghorn ...	83	106	119	112	102	522
24 Paddy King & Salter, White Leghorn ...	95	101	105	108	104	513
25 Bon Accord Poultry Yard, White Leghorn ...	94	119	102	116	79	510
26 W. Elliot, White Leghorn ...	89	109	109	114	88	509
27 Greenville Poultry Farm, Silver Wyandotte ...	105	97	107	110	88	507
28 Mrs. Hobley, White Leghorn ...	87	118	111	110	80	506
29 Devine & Migro, White Leghorn ...	58	94	115	121	100	488
30 Mrs. Younger, White Leghorn ...	41	97	121	126	103	488
31 Mrs. Flynn, White Leghorn ...	78	94	114	111	90	487
32 Coolgardie Poultry Farm, White Leghorn ...	66	97	110	112	96	481
33 Honner and Forbes, R.C. White Leghorn ...	69	99	111	114	85	478
34 Ontario (S.A.) White Leghorn ...	72	82	106	140	75	475
35 The Elms Poultry Yard, White Leghorn ...	51	92	111	124	96	474
36 Craig Bros., Black Orpington ...	70	97	90	121	96	474
37 R. G. Flynn, White Leghorn ...	86	92	88	101	104	471
38 O.K. Poultry Yards, White Leghorn ...	34	105	119	115	92	466
39 Mrs. Hughes, White Leghorn ...	57	92	126	116	75	466
40 J. R. De Morrison, White Leghorn ...	61	104	108	105	82	460
41 *J. D. Wilson, Brown Leghorn ...	42	84	110	117	104	457
42 G. George, White Leghorn ...	66	96	103	106	85	456
43 *J. Stuart, Golden Wyandotte ...	69	101	99	103	77	449
44 *T. W. Martin (late O. James), White Leghorn ...	62	104	114	93	76	449
45 A. E. Champness, White Leghorn ...	40	108	109	110	76	443
46 *White Wings P.F. (No. 2), White Leghorn ...	71	93	103	111	63	441
47 South Perth Poultry Farm, R.C. White Leghorn ...	61	91	92	108	87	439
48 *Adelaide Poultry Yard, R.C. Brown Leghorn ...	62	99	106	96	74	437
49 F. Whitfield, Minorca ...	57	71	89	122	83	422
50 Mrs. McGree (No. 2), White Wyandotte ...	40	90	108	81	94	413
51 Adelaide Poultry Farm, Buff Leghorn ...	33	82	104	106	87	412
52 *Mrs. McGree (No. 1), White Wyandotte ...	49	107	91	99	59	405
53 Hillview Poultry Farm, White Leghorn ...	51	92	83	89	81	396
54 *Craig Bros. (No. 1), White Leghorn ...	30	93	88	103	81	395
55 *Mrs. H. M. Kelley, Gold Wyandotte ...	33	85	96	92	76	382
56 T. Hickey, White Leghorn ...	0	84	130	102	64	380
57 *J. Stuart, Silver-pencilled Wyandotte ...	33	74	101	94	77	379
58 *White Wings Poultry Farm (No. 1), White Leghorn ...	52	65	80	96	85	378
59 Craig Bros. (S.A.) (No. 2), White Leghorn ...	49	81	90	88	61	369
60 *Mrs. H. M. Kelley, White Leghorn ...	23	68	106	104	60	361
61 J. Stuart, S.L. Wyandotte ...	57	72	83	62	79	353
62 R. L. Martin, Black Orpington ...	95	84	69	62	71	345
63 Craig Bros., White Orpington ...	57	73	60	67	48	305
64 J. Miller (late Dobson), Silver Wyandotte ...	34	59	40	38	36	207

Winner of first monthly prize, Mrs. A. S. Craig, Black Orpingtons, 131 eggs; second month, Mrs. A. S. Craig, 145 eggs; third month, A. H. Padman, White Leghorn, 146 eggs; fourth month, Mrs. Craig, Black Orpingtons, 146 eggs; fifth month, S. Craig, White Leghorns, 135 eggs.

Winner of first three months test, Mrs. A. S. Craig, Black Orpingtons, 405 eggs.

EGG-LAYING COMPETITION—*continued.*

DUCKS.

Six ducks and one drake in each pen.

Owner and breed.	July.	Aug.	Sept.	Oct.	Nov.	Total.
1 *G. Thomson, Indian Runner	131	135	150	142	131	689
2 F. Whitfield, Indian Runner	106	148	146	156	132	688
3 D. F. Vincent, Indian Runner	119	132	133	177	123	684
4 White Wings Poultry Farm, Buff	114	177	162	166	63	682
5 *Mrs. L. Mellen, Indian Runner	131	141	154	149	101	676
6 *Smith & Davenport, Indian Runner	116	128	136	154	125	659
7 C. Phillips, Indian Runner	101	117	144	150	140	652
8 H. Carr and Son, Indian Runner	142	137	136	118	95	628
9 J. Robertson, Indian Runner	32	108	179	143	139	601
10 C. Geddes, Indian Runner	89	134	134	135	70	562
11 J. Moyle, Indian Runner	114	115	137	102	90	558
12 Mrs. R. B. Moyle, Indian Runner	132	127	92	113	84	548
13 *South Perth Poultry Farm (No. 2), Pekin	7	116	160	147	116	546
14 A. W. Edgar, Indian Runner	12	96	149	152	127	536
15 Bon Accord Poultry Yard, Buff	54	86	132	137	110	519
16 C. W. Johnston, Indian Runner	24	26	120	165	177	512
17 Adelaide Poultry Yard, Indian Runner	49	105	122	124	91	491
18 *F. Whitfield (late Disting), Indian Runner	72	48	108	128	127	483
19 South Perth Poultry Farm (No. 1), Pekin	0	50	137	145	139	471
20 Greenville Poultry Farm, Indian Runner	68	85	140	128	47	468
21 Coolgardie Poultry Farm, Pekin	0	40	143	106	127	416
22 Simplex Incubator Factory, White Indian Runner	4	9	109	162	94	378

Winner of first monthly prize, H. Carr and Sons, Indian Runners, 142 eggs; second month, White Wings Poultry Farm, Buff Orpingtons, 177 eggs; third month, J. Robertson, Indian Runners, 179 eggs; fourth month, D. F. Vincent, Indian Runners, 177 eggs; fifth month, C. W. Johnson, Indian Runners, 177 eggs.

Winner of first three months test, White Wings Poultry Farm, Buff Orpingtons, 453 eggs.

SECOND YEAR'S TEST—FOWLS.

Owner and Breed.	July.	Aug.	Sept.	Oct.	Nov.	Total.
1 J. Stuart, Golden Wyandotte	69	101	99	103	77	1,849
2 Craig Bros. No. 1, White Leghorn	30	93	88	103	81	1,690
3 Mrs. McGree, No. 1, White Wyandotte	49	107	91	99	59	1,593
4 J. D. Wilson, Brown Leghorn	42	84	110	117	104	1,582
5 T. W. Martin (late James), White Leghorn	62	104	114	93	76	1,524
6 Mrs. Kelley, Golden Wyandotte	33	85	96	92	76	1,501
7 Adelaide Poultry Yard, R.C. Brown Leghorn	62	99	106	96	74	1,486
8 J. Stuart, Silver-pencilled Wyandotte	33	74	101	94	77	1,304
9 White Wings Poultry Yard No. 1, White Leghorn	52	65	80	96	85	1,273
10 J. Miller (late Dobson), Silver Wyandotte	34	59	40	38	36	1,240
11 Mrs. Kelley, White Leghorn	23	68	106	104	60	1,171

SECOND YEAR'S TEST—DUCKS.

Owner and Breed.	First year.	July.	Aug.	Sept.	Oct.	Nov.	Total.
1 G. Thomson, Indian Runner	1,571	131	135	150	142	131	2,260
2 Smith and Davenport, Indian Runner	1,333	116	128	136	154	125	1,992
3 F. Whitfield (late Disting), Indian Runner	1,493	72	48	108	128	127	1,976
4 Mrs. L. Mellen, Indian Runner	1,244	131	141	154	149	101	1,920
5 South Perth No. 2, Pekin	840	7	116	160	147	116	1,386

FARM ACCOUNTS.

HOW TO KEEP THEM.

By C. S. ORWIN, F.S.I.

When one considers the amount of attention that has been of late years bestowed upon agricultural matters, some surprise is occasioned that the question of farm book-keeping has commanded so little notice. In any other business it is recognised that an accurate system of accounts forms almost the basis of success, because by this means alone can the trader discover the most profitable lines upon which to develop his undertaking. In this respect the farmer is, of course, at a certain disadvantage in comparison with the purely commercial man, since his sphere of operations is limited by the capabilities of his land, by the resources of his district, and by his own particular bent ; but even so it must be obvious that accurate information as to where his profits and his losses really occur would be of the greatest service to him.

The first step in the management of an accurate system of farm accounts is for the farmer to decide under what headings potential profits may be made. These headings will, of course, vary according to individual farming practice. Accounts must then be opened in a ledger under these headings, and it must be borne in mind that sooner or later every item of income and expenditure must be brought into one or other of these accounts. Upon an ordinary mixed farm the accounts opened will be somewhat as follows :—

Cattle accounts—

1. Breeding stock
2. Store stock
3. Feeding Stock

Sheep accounts—

4. Breeding flock
5. Lambs
6. Feeding sheep

Pig accounts—

7. Breeding sows
8. Store pigs
9. Fattening pigs

Land accounts—

10. Arable land
11. Meadow land

The farmer can further sub-divide these accounts to any extent. Thus different lots of cattle bought to fatten may each have a separate account under the feeding stock heading ; the milking cows of one breed may have an account separate from that of the cows of another breed ; in fact, the only

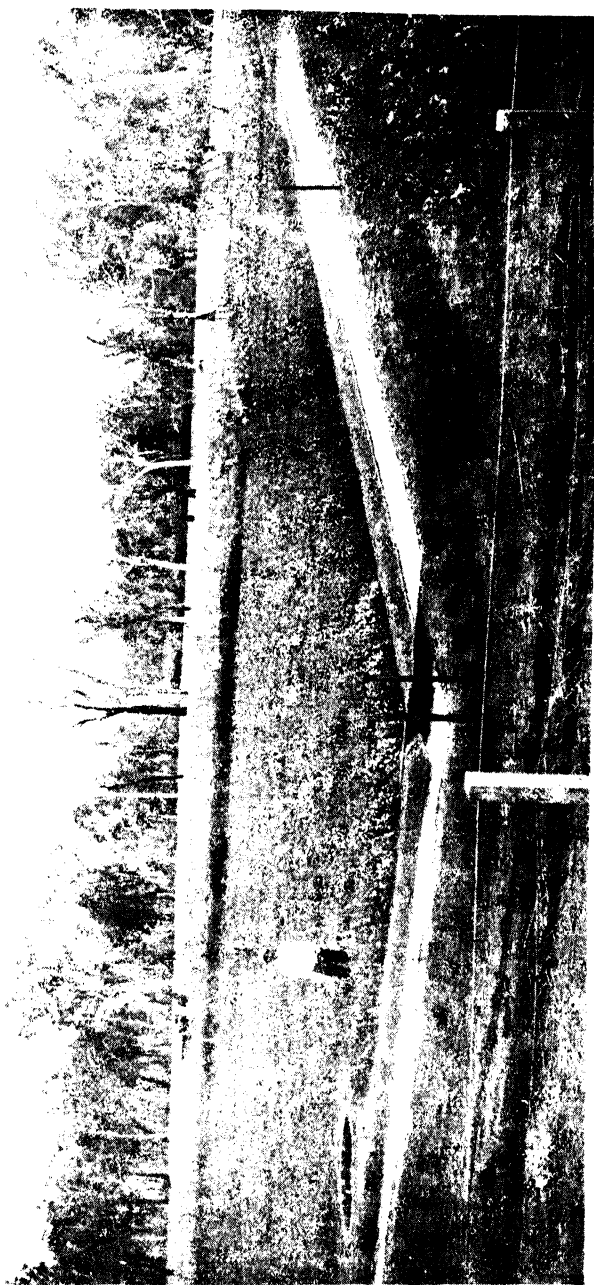
limit to the amount of sub-division is the time the farmer is prepared to devote to his book-keeping, and the greater the number of his accounts, the more readily will he get at the results of his farming. No accounts other than these, and not necessarily all of them, must appear in the profit and loss account. Subsidiary accounts will have to be opened in the ledger from time to time, but sooner or later their balances will be transferred to one or more of the foregoing.

Live Stock Accounts.

There is no account for horses because it is assumed that only working horses are kept, and the cost of their labour will have to be charged to the accounts for which the work is done. Where horses are bred, an account would be opened under the heading of young horses, and to this would be charged all expenses from foaling until the time when the young stock is sold or added to the working teams. At the beginning of the year each of the live stock accounts must be debited with the value of the stock falling under that particular heading. As the year goes on, each account must be debited further with the share of (a) manual labour, (b) horse labour, (c) rent and rates, (d) grazing, (e) foods both home grown and purchased, (f) establishment expenses and any other charges and expenses properly incurred by each account. Each account must be credited with (a) the proceeds of stock sold, (b) the value of stock transferred to other accounts. There is of course a continual transference of stock from one account to another. Thus, where the calves are weaned, the breeding stock account is credited and the store stock account debited with their value. When the heifers come into the herd, or when steers are put up to fat, the store stock account is credited and the breeding stock account or the feeding stock account as the case may be, is debited. Similarly for sheep and pigs. Bulls, rams, and boars are, of course, charged to breeding stock accounts. (c) The valuation of stock remaining at the end of the year. (d) the manurial residues of foods consumed, and with any other receipts. By balancing accounts thus kept at the end of the year, the true profit or loss on each is ascertained.

Arable Land.

At the beginning of the year this account is debited with (a) cultivations done, seed sown, and manures applied for the coming crops, (b) unexhausted manures. During the year it will be debited further with (c) all manual and horse labour expended on preparation for sowing, after cultivation, securing and marketing the crops, (d) rent and rates, (e) establishment expenses, and any other charges and expenses properly incurred. The account must be credited with (a) the proceeds of corn and other crops sold, (b) the value of corn fed to stock, (c) the value of seeds, hay, and straw used for fodder (straw used for litter may possibly be ignored, since it comes back into the arable land in the form of dung), (d) mangolds, at the value on the farm, (e) seeds grazed, and fallow crops fed, at their letting value in the district, (f) cultivations done, seed sown, and manures applied for the following year's crops, (g) the value of unexhausted manures at the end of the year, and any other receipts. This account, balanced at the end of the year, will show a true profit or loss on the arable land.



Baby State Farm, Brunswick. River Flat, with Lincolnton, Rye, Peas, and Mangels under Irrigation.

Meadow Land.

This account must be debited with (a) any manures unexhausted at the beginning of the year, (b) manures applied during the year, (c) the labour of haymaking, and marketing hay sold (d) rent and rates (e) establishment charges, and any other charges and expenses properly incurred. It will be credited with (a) the proceeds of hay sold (b) the consuming value of hay fed on the farm, (c) the value of the grazing after the hay harvest, (d) unexhausted manures, and any other receipts. Here again the balance of the account at the end of the year shows the true profit or loss.

This completes the description of the accounts which go to make up a correct profit and loss account, but in order to keep them in the manner indicated, it will be found necessary to open various subsidiary accounts.

Labour.

No ledger account is required for manual labour. The daily or weekly labour sheet shows how each man has been employed, and his time can be charged to the proper account. It is not desirable to enter it in the ledger daily, but an analysis sheet can easily be kept, and the labour under the different headings posted to the proper accounts weekly, monthly, or quarterly. For horse labour a ledger account is essential. This account will be debited with (a) the valuation of the horses and their harness at the beginning of the year, (b) cost of food during the year, (c) shoeing, (d) repairs to harness, (e) share of rent, and any other expenses properly chargeable. The only credit will be the valuation of horses and harness at the end of the year, and the balance of the account represents the cost of the horse labour on the farm. This cost must be shared out over the different accounts, according to the amount of horse labour performed for each. The readiest means of arriving at this is by keeping a record of the number of days' work done for each account. The labour sheet, besides stating how each man has been employed, should set forth the number of horses he has had with him. These are apportioned amongst the various accounts and the totals are carried forward from week to week till the end of the year. The cost of the horse labour may then be allocated in proportion to those totals.

Rent and Rates.

These require no ledger account. Rates are easily apportioned between land and buildings by taking the rate collector's figures. Generally speaking, the buildings will be taken as representing about 10 per cent. of the rateable value of the holding, and rent may be apportioned between land and buildings on the same basis. Rent and rates on buildings must be apportioned over the cattle and other accounts, whilst rent and rates on land must be divided between arable, meadow, and pasture. If the farmhouse and cottages are not separately assessed, a proportion of the rent and rates charged on buildings must be allocated to establishment (*q.v.*) in respect of them.

Grazing.

No profit or loss is made on pasture land, because its produce is not directly marketable. It serves solely to supply food to the live stock of the farm, and in order to ascertain the cost of this food it is necessary

to open a ledger account for grazing, debiting it at the commencement of the year with any unexhausted manures, and during the year, with rent and rates, and the values of the manurial residues of foods fed on it. On the credit side of the account will appear the value of manurial residues unexhausted at the end of the year, and the balance of the account will show the cost of the grazing for the year. This cost must then be charged to the various cattle and sheep accounts, according to the number of days' grazing enjoyed by each. To simplify this apportionment each beast may be reckoned as the equivalent of 6-8 sheep.

Purchased Foods and Manures.

Whenever possible, these are to be charged straight away to the account which will use them. When this cannot be done a ledger account for the purchased foods and manures must be opened, debiting it with purchases and crediting it with foods consumed and manures used from time to time. The different stock accounts will be debited with what they eat and the different land accounts with the manures they receive. The balance of the account at the end of the year represents foods and manures on hand, and is carried forward to the year following.

Implements.

Another ledger account is required under this head. It is debited with the valuation of the implements at the beginning of the year. The depreciation during the year is arrived at by preparing an inventory and valuation of all implements and estimating the life of each. The true depreciation with which to credit the account is thus arrived at and the valuation at the end of the year is got by subtraction. It is a matter of no little difficulty to apportion a depreciation of implements over the accounts with accuracy, but with a little thought and trouble it may be accomplished. Thus it will be obvious that the loss in the value of ploughs, harrows, binders, reapers, etc., should be charged to the arable land; the loss on cake-breakers, root cutters, etc., to the stock, and so on. Depreciation on carts, waggons, etc., which are used for all manner of purposes, can either be charged to the horse account, thereby increasing the cost of the horse labour, or it may be carried to the establishment account.

Establishment.

It will be found in keeping accounts on the lines here indicated, that certain payments and charges arise which cannot fairly be placed to any of the accounts yet mentioned. The foreman's wages, repair to farm roads, travelling expenses, keep of the farmer's nag horse, etc., cannot be dealt with on the lines laid down. For these matters an establishment account is opened in the ledger, and the method of dealing with it adopted by the writer is to share the balance over all the other accounts in proportion to their turnover—the assumption being that the account with the largest turnover has benefited to the greatest extent by the establishment expenditure. This is a very rough and ready way of disposing of the account, and to reduce any error to a minimum, the total under this head must be kept as small as possible; that is to say, nothing must be charged to it that can by any means be placed direct to the other accounts.

One cannot here do more than suggest the lines upon which farm accounts should be kept, and the varying requirements of varied farming practice make it impossible to indicate any set forms of labour sheets or book rulings universally applicable. But enough may have been written to enable the thoughtful reader to evolve his own particular system, and he can be guaranteed both pleasure and profit in the process.

CORRESPONDENCE.

DIE-BACK IN APPLE TREES.

Mr. J. Enright, writing from Mt. Barker, on November 20, states :—

“Yours of the 12th inst. to hand, also copy of the *Journal*, for which I thank you. After carefully reading the article on Die-back in Apple trees, I cleaned the soil from around some of my trees—which are affected and found the roots evenly distributed, of large size and healthy looking. The trees were carefully planted by myself on well-drained, sandy soil, three feet deep, with clay sub-soil.

I am of opinion that the trouble with my trees is in the tops ; also that the disease is spread with the secateurs, as in rows in which two or three trees were affected last year, quite a number are affected this year ; then, perhaps, the next row is making fine, healthy growth, and the next row or so are affected, and so on. I am sending you, under separate cover, a few twigs cut from diseased trees. If you could get these subjected to analysis or examination, to ascertain whether or not there is any blight or bacteria in them and let me know result, I shall esteem it a great favour. If there is any charge, I shall be only too pleased to pay it, as the disease is having a disastrous effect upon my orchard.”

After submitting the above letter to the Entomologist, the following reply was sent to Mr. Enright.

“With reference to your letter of the 20th ult., the twigs you sent were too dried and shrivelled to be of any use for examination. Could you kindly forward further samples of the disease, wrapping the specimens in a piece of damp cloth, so that they will arrive fresh, when an examination as suggested by you, will be made.

The disease is known as “Die-back,” and is the result of some root trouble due to any of the following causes:—Want of drainage, pooriness of soil, or lack of proper manures.

Good, thorough drainage is the first principle of a successful orchard. This does not mean surface drainage, but a deep subsoil drainage, as during the winter months a great amount of rain falls in a short period, causing the soil to become water-logged and sour. The trees are very often in this state for a couple of months, which causes the fibrous roots to rot off. These small

roots are very necessary to the tree in the Spring, as they are the first roots to act, being in the warmer layers of the soil. If these have rotted off, the tree, after starting, will die back, through lack of the necessary food supply, the large deeper roots not having commenced to act.

The dying twigs are attacked by a fungus, which continues to work back in the tree, unless cut back to a healthy bud.

This stagnation at the roots is the cause of the sour, fermenting smell of the sap. The ground should be dressed with from two to six lbs. of lime per tree, followed by a dressing for young trees of—

½lb. Saltpetre,

½lb. Sulphate of Potash,

1lb. Sulphate of Iron, per tree.

For matured trees, twice the above amount.

As a substitute for the Saltpetre, dress with—

½lb. Sulphate of Potash,

½lb. Muriate of Potash, per tree.

Prune out all the diseased wood, painting the cut with tar. Do not use the same secateurs on healthy trees without first disinfecting them.

A CHEAP WHITEWASH.

A cheap whitewash which will stand the rain and weather without coming off, and will do for galvanised iron: Place enough tallow required for the purpose in a large bucket, then lay about the same quantity of good lime (dry) on top of tallow, i.e., equal proportions of each, then pour enough water on to slake the lime. When the heat from the lime has melted the tallow, and all is well dissolved, stir it thoroughly until all is well mixed, then apply (warm if possible) with a large brush. This will do for any surface. The surface must be quite dry before applying the mixture. If required to dry very white, add a small quantity of blue.

Whitewash for outside work: Take a clean watertight barrel, and put into it half a bushel of lime; slake it by pouring water over it boiling hot, and in sufficient quantity to cover it five inches deep, and stir in briskly till thoroughly slaked. When the slaking has been effected, dissolve it in water, and add two lbs. zinc sulphate and one lb. common salt. These will cause the wash to harden and prevent its cracking. Common colouring is prepared by adding earthy pigments to the mixtures used for lime whiting (which is white-washing of hot, pure white lime and water, improved by adding 1lb. of tallow free from salt to every bushel of lime). The following (approximately) are the proportions of colour to every bushel of lime, according to tint required:—Cream colour, 4lbs. to 6lbs. ochre; fawn colour, 6lbs. to 8lbs. umber; Indian red, 2lbs. lamp black; buff or stone colour, 6lbs. to 8lbs. raw umber, and 3lbs. to 4lbs. lamp-black.

RECIPES.

Sickness in Swine.—An English breeder says :—"I have only one remedy for a sick pig. It is a simple one. Rheumatism, paralysis, blind staggers, thumps, scours, etc., I treat all alike, though in varying proportions. My cure-all is nothing more than fresh new milk and turpentine. For a young pig, say six weeks old, administer a teaspoonful of turpentine in, say, half a pint of milk. Unless the pig is sick it will readily drink this. If too sick to drink, it must be administered with a spoon. An older pig, however, will seldom refuse new milk, even when a tablespoonful is given in a quart or more. Grade the dose from a teaspoonful at six weeks to a tablespoonful or more for a mature hog.

Loose Teeth in Cattle.—This often results from a debilitating disease or poor condition. Treatment : Good nourishing feed. Give the following powder mixed with a pint of cold water daily :—

Powdered sulphate of iron, 1 drachm.

Powdered nux vomica, 40 grains.

Powdered gentian, 2 drachms.

This dose is for an animal of 3 years and over. Also give a lick composed of slaked lime 1 part, sulphur 1 part, salt 6 parts.

Grease and Mange in Horses.—The cause should be removed and each case treated on its merits and in accordance with indications at the time. In the early stage of grease a solution of sugar of lead and sulphate of zinc can be used. Dissolve 1oz. each of acetate of lead and sulphate of zinc in a quart of distilled or rain water. Apply after dry cleaning the parts, which should be washed after returning from work.

For equine mange, is the following formula :—Oil of turpentine and spirits of tar, of each 8ozs. ; liquor potasse, 6ozs. ; sublimed sulphur, $\frac{1}{2}$ lb. ; olive oil, to $\frac{1}{2}$ gal. The animal should be first well washed with warm water and Sanitas animal soap, the stable walls, stalls, manger, and floor cleansed and disinfected, the bedding mucked out and burned, and the harness, shafts, tools, and clothing also attended to.

SALE OF LIVE STOCK, BRUNSWICK STATE FARM.

A large number of settlers and town residents visited the State dairy farm at Brunswick on the occasion of the initiatory annual sale of live stock by the Department of Agriculture. Mr. Albert Clerk, Government auctioneer, conducted the sale and the results were regarded as satisfactory and of a sufficiently encouraging nature to warrant the sales being instituted an annual fixture. Advantage was taken by visitors to go over the farm and various buildings, making an inspection of the irrigation work. Demonstrations were given also in the work of the dairy and the making of ensilage. This comprised the operations of the Ohio silage cutter and blower, which were highly interesting. The machine was capable of treating five tons of green fodder an hour, which was blown into the silo as fast as it was cut.

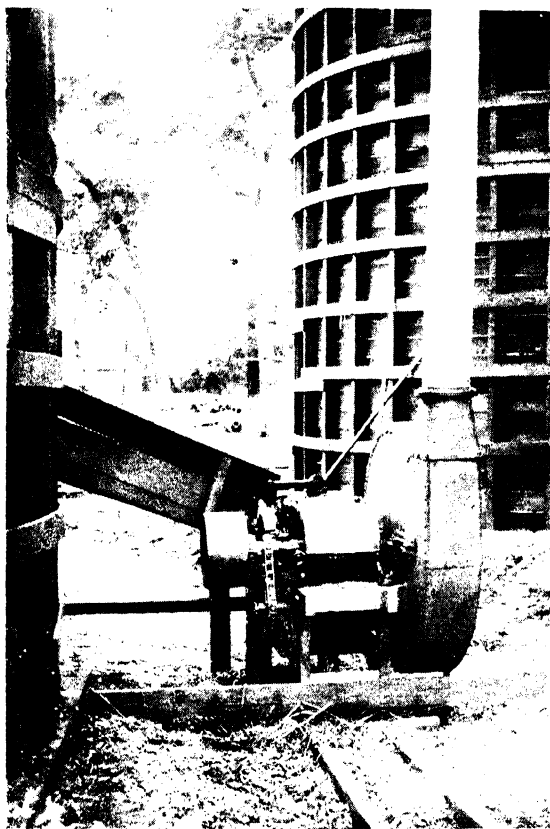
Fourteen pedigree Ayrshire yearling bulls and ten Ayrshire heifers sold at an average of seven guineas. Dexters brought an average of £4 11s. 6d. Other yearling heifers realised from 30s. to £3 10s. each. Rams sold at from 2½ to 5 guineas. Berkshire pigs sold at the following prices :—9 at 25s. each ; 1 at £1 12s. 6d. ; 3 at £1 8s. each ; 1 at £1 10s. ; 8 at £1 1s. each.

AN ENCOURAGING ASPECT.

An interesting feature of the sale was the purchase by farmers from various districts of the pure-bred Ayrshire yearling bulls. This dispersal of dairy stock gives good augury for the progress of the dairying industry in the best centres, such as Cannington, Guildford, Yarloop, Harvey, Capel, Roelands, Bunbury, and Brunswick.

In the opinion of Mr. Kinsella, the Dairy Expert, the young bulls, although not in that excellent condition in which breeders in the Eastern States got their stock for show purposes, or for sale, are, however, well-bred and in good order. The idea of the Minister for Agriculture for improving the general milking herds of the State will be fully realised, if not immediately, at any rate a few years later. The value of these pure-bred animals was hardly appreciated to its full extent by farmers. Although the young stock went off well at the sale, they did not bring anything like the prices that similar young stock would fetch from the same strain of cattle sold in the Eastern States. The Ayrshires were not the best breed of cows for butter production, pure and simple, but Mr. Kinsella says he is a strong believer in this class of cow for the city milk trade and for cheesemaking purposes, and that the Ayrshire bulls crossed with the average dairy cow found in this State would give good results.

Arrangements were recently made by the Government of India with Victoria for the purchase of a large number of dairy cattle and some pure-bred bulls for the purpose of improving and establishing dairy herds in the hilly country of India to replace the indigenous breeds of cattle that were of poor quality for milking purposes. After considerable correspondence the



State Dairy Farm, Brunswick,
Ohio. Silage Cutter and Blower.

Indian Government decided on the Ayrshire cattle as the most likely breed to suit their climate and requirements for milk production. Amongst the large number of pure-bred animals sent to India by the Victorian Government, which were selected by Mr. Cameron, the Chief Veterinarian of the Department of Agriculture, were a fairly large number obtained from Mr. Wm. McNab's Oakbank herd, and a number from Mr. T. A. Grant's Glen Elgin herd. Most of the pure-bred Ayrshires now on the State Farm, Brunswick, were purchased from these two herds.

BULLETINS ISSUED BY THE DEPARTMENT OF AGRICULTURE.

Settler's Guide, 2nd, 3rd, 4th and 5th editions.

Handbook of Horticulture and Viticulture (A. Despeissis). 2s. 6d. and 1s.

New Dairying ("Agricola").

Production of Lucerne.

Diseases of Honey Bees (John Sutton).

What can be done by the Beginner on the Soil (Hon. James Mitchell, Minister for Agriculture).

Stack Silos (A. Despeissis).

Report of Proceedings of Conference of Producers.

The Diseases of Animals and Meat Inspection (J. Burton Cleland, M.D., Ch. M., Syd.).

Factory Dairying (J. A. Kinsella).

Vegetable Growing (G. Chitty Baker).

Examination of the W.A. Poison Plants (E. A. Mann).

Care and Treatment of Milk and Cream (J. A. Kinsella).

Hints to Stock-breeders (Weir).

Meat Inspection and Diseases of Animals (J. B. Cleland, M.D.).

Poultry, Care and Management of (F. H. Robertson).

Potato Culture (T. J. Wallas).

Back volumes *Journal of Agriculture*.

Tobacco Cultivation (H. Allerton Cowper).

Cotton-growing (H. Allerton Cowper).

Dingo Trapping.

The New Sun-Dial (W. E. Cooke).

The Silo on the Farm (J. A. Kinsella).

Conference of Producers, 1908—Report of Proceedings.

Free copies of such publications as have no prices attached can be obtained on application.

PIGS FOR PROFIT.

(JOHN WALKER).

QUALITIES OF FOODS.

The pig is a more general feeder than any other animal probably, and that should remind us how important it is that change of diet should be provided. And change of diet we have at hand, for there is little, sure dry fodder, that is at all edible about the farm that may be turned to good account for either store, brood sow or fattening hog. It is using up the articles in proper order and most economical way that puzzles many men, and nothing assists more here than knowledge of the principles of the foods, which we will in a measure briefly show. And when all is said, pig-keeping to any material profit must generally depend upon the animals acting to a degree as scavengers, clearing up odds and ends that other animals leave, consuming what otherwise would be waste, say, from allotment or garden, swill-tub, dairy, and cottager's kitchen.

Wheat.—This is the most nutritious of all grain, containing out of 1,000 parts about 955 nutritive matter. It should be ground and served with some lighter and less starchy meals, such as barley, or better still, peas. It may be used for youngsters when about three months old and onwards. It is neither purgative nor astringent.

Barley.—This cereal is at once the most popular and useful pig food, being suitable for all times and seasons. It is not quite so nutritive and fattening as wheat, possessing about 920 parts of nutritive matter, hence it bears using more constantly and more freely than any other cereal. It should be ground, for the most part, and goes well with either a little pea, wheaten, maize, or rice meal; and it is cheap enough if other than prime malting samples are taken; even good bodied though stained samples answer well.

Oats.—We do not approve of oats save when they are picked up in the stubble and plenty of vegetable diet is taken to make up the complement of food; for although possessing 743 parts of nutritive matter, piggy is not able to get all out of them, as they are too fodderly, hence are passed whole more than is desirable. They answer better, a good deal, for the close grinding horse or ruminating cow and sheep.

Maize.—Very nutritious—almost up to wheat in this regard, and comprising as it does materially the food of infants fed from the bottle, it is suitable for young farrows, as well as older swine. It is better mixed with other meals, say, pea for making pork or bacon, and it is said to produce more fat than desirable to the lean or flesh. Still, it soon makes a fat pig, and practical farmers and pig-keepers who have to pay the rent, look at that a good deal. No doubt, as far as the bacon-curer goes, he would prefer the carcass fed on wheat, barley, and peas. Judicious blending of the feeds answers best for all.

Peas.—These are useful for blending purposes for strong pigs, but not suitable for quite youngsters. They should be ground mostly, and being astringent, go well with relaxing diet. They, too, correct over starchy food. As a rule, a fourth of the meals only should be composed of peas, and white peas are better than the common brown variety. An average sample contains almost 574 parts of nutritive matter. They always go well with potatoes and other vegetables for pork or bacon-making.

Beans.—Are slightly less nutritive than peas, are over-heating and are only advised for pigs in the open field, or given in shape of meal in small proportions with the other diet, and that to other than youngsters. Confined pigs fed freely on beans “go off their feet,” *i.e.*, suffer from fever in the feet. The grain is astringent and fattening. We have, ere now, used a fourth part bean meal with three-fourths barley and wheaten-meal for strong bacon pigs with fairly satisfactory results, for topping-up purposes.

Rice Meal.—Is a very nice diet. It may be used for the farrows’ first solid food, for porkets, or for any others—even the sick pig. It is of a starchy nature, like all other cereals, hence a little pulse meal acts well with it for strong pigs. It is not quite so pushing as wheat and barley, but it is often got at a reasonable price, and may be said to be rather an overlooked article of diet. We have known fattening done entirely on it. For quite young ones it should be scalded, and thus served is the best of diet for newly-weaned farrows.

FLUID FOODS AND SUNDRIES.

Milk.—Is the sheet anchor for feeding thousands of pigs in dairying districts. With little help it puts on fat and flesh apace. Butter milk, too, is nutritious, but not as flesh and fat producing as skim milk. The latter is astringent, too much so if not soured in the cistern, but butter milk is fairly laxative.

Whey.—This fluid takes a good deal the same place for the cheese-dairymen’s pigs as milk does for the butter-maker’s. While quite wholesome for pigs, it will almost starve calves, hence should always be reserved for the former. For porkers it should, like milk, be improved with a little barley, or other cereal meal, and vegetables, and coal slack be provided therewith to keep the bowels in healthy order.

Swill.—Milky wash, broth, dish-water, and all such like waste from the house is quite good for pigs, and if it be hotel wash it is often very nutritious and fattening. By carting out wash from hotels and places of that kind in towns many men make pig-farming pay very well. Of course, in average cistern-swill, vegetables, seraps, bits of meat and all kinds of waste find their way, and all appear to work together for good so far as piggy is concerned.

Brewers’ Grains.—Too many of these pass whole, so in no case are anything approaching fattening. If served, they should be to strong stores getting other and more heat-giving diet.

Grit.—This is important. It helps to digest the food; it encourages healthy action of the bowels and satisfies many a craving that unhealthy pigs or breeding sows suffer from. It may consist of coal slack, old dry mortar, or in fact any hard substance of that kind that the animals can crack.

It ought not to be supplied in the food, but in a place aside where kept clean. Then pigs may take as much as they care to, and confined ones need it far more than those at liberty, which are bound to find a quantity somewhere, so much do they crave for it.

Meat.—Pigs are, no doubt, by nature flesh-eaters, and a good many stores and fatteners are fed on butchers' offal. One hardly fancies pork or bacon so produced, but all the same, much is fed on the dietary improved with meal, and the animals appear to keep healthy enough, which is a proof of wholesomeness.

VEGETABLE DIETARY.

There is only space here to deal with a few of the most important vegetable foods.

Potatoes are far away the best. Just how valuable depends upon what starch is estimated at and how much of it is digested. Here we may best judge of value therefore by taking the pig's condition as the index. And pigs usually thrive well on cooked tubers, but not on uncooked. Pea meal is the best accompaniment to go with the tubers, being pretty free from starch. Good milky wash, too, and potatoes have fed many a pocket, or thereabouts ere now. Potatoes should be boiled and the water thrown away.

Swedes and Mangels.—Swedes are chiefly useful as laxative, fill-belly diet, or to accompany more heating, but are not to be compared with potatoes for flesh forming. They should be cooked. Mangels should be fed warily. They are too indigestible by far before well mellowed up, and have never much push in them. They are, however, much better off some land than others.

Parsnips, Carrots, and Beet.—Parsnips are very useful if cooked and fed with nutritious meal or milk, and come next in value to potatoes. Carrots are not advised, and beet is similar dietary to mangel; in fact, beet is a variety of mangel, but contains more sugar, hence more nourishment.

Cabbages, Clovers, Vetches, etc.—Vetches appear most relished and are the pick of these vegetables. All are useful as blood purifiers, and it must always be remembered that vegetables pigs must have, to keep them in health. Such herbage as clovers, grasses, and vetches strong stores may very largely subsist on in hot weather.

NOTICE TO SUBSCRIBERS.

Subscribers, whose subscriptions to the *Journal* terminate with the December number, are requested to forward to the Editor notice of renewal with amount of annual subscription (Five shillings) enclosed, or notice to discontinue, as the case may be. The Editor reminds subscribers who omit to comply with this rule that they are liable to have their names removed from the subscribers' list.

HOW TO CHOOSE A BOAR.

Every man who keeps two or more sows should have his own boar, which should be pure-bred and with a vigorous constitution. In "Swine Husbandry," by Coburn, the following characteristics are given of a good sire:—

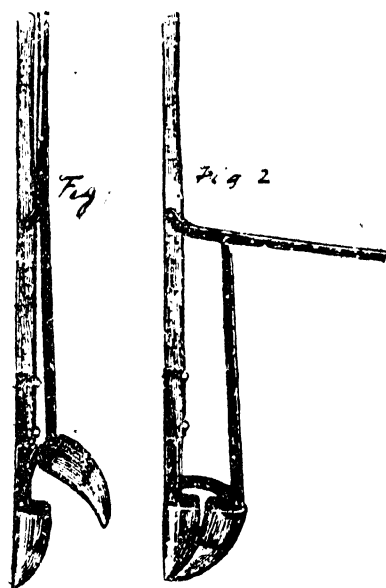
"The boar should have a fine extended form, which is the result of a superior organism; a short, broad face, with a round, heavy under jaw, and a thick short neck, indicating strong vitality and assimilating powers, two functions requisite in every first-class meat producing animal; width between the fore-legs and large girth immediately behind them, denote room for large and active lungs, the very foundation of any animal. Ribs that are long and well sprung outward from the back show capacity of stomach. The broad loin and well-developed ham are signs of active kidneys.

"A clean, fine, elastic skin covered with soft lively hair, free from bristles, denotes a healthy liver and freedom from internal fever. A fine muzzle and limbs, clean, small joints, and standing square upon the feet, denote solidity, strength, and firmness of the animal's framework; while the dished or concave face and slightly drooping ear are unerring signs of an easy keeper and a quiet, contented disposition."

Having such a boar in his possession, the first obligation on the owner's part is to keep him properly. The most common mistake is to confine him in a small pen with insufficient yard room. Every animal needs plenty of fresh air and exercise, and only a moderate supply of food. The boar's pen should be at least 12 feet by 12 feet, with plenty of sunlight, and a yard of not less than 100 feet by 12 feet. It ought to be away from the other pig-pens. The fact that the boar is to be the sire of the future litters should never be lost sight of, and he should be treated with great care and kindness. As to food, a strong, vigorous boar from one to four years old, may be fed on swill mixed with a little barley, pea, or oatmeal; but by swill is meant good, wholesome refuse, not offal or decayed food. There should be the addition of green feed to the ration, such as lucerne or clover. The number of sows to a boar will depend on the age of the animal, and on constitutional vigour. The pen should be kept clean, and the yard raked occasionally. Pure water should be always on hand. A good brushing two or three times a week will keep the skin in a healthy condition. Kind treatment will result in a gentle, quiet-dispositioned boar, and one that will be easy to handle in the breeding season.

POST HOLE DIGGER.

Much unnecessary labour is expended in digging post holes. In order to excavate to the required depth, the digger is compelled to widen the whole at the surface, and generally, to make it much too wide all round. The consequence is that when the post is put into position there is a correspondingly great amount of refilling and ramming, whilst the post itself is not fixed as firmly in the ground as can be wished. The work is slow, laborious, and expensive.



To overcome these difficulties is very desirable, especially in loose, sandy, or clay country. The illustration represents an implement which meets the situation and should find favour with fencers. It combines the requirements of the pick and shovel, and very greatly facilitates the work. In Fig. 1, it will be seen that at the bottom of the handle is a box-jaw, and running parallel with the handle is a hand lever moving another jaw at the bottom. The hollow of each jaw is opposite to one another when both are closed (Fig. 2). With the jaws apart, the digger jaw of the handle is dug into the ground, the lever is then pressed and forces its jaw into the ground also, bringing it close upon the other jaw and both are filled with earth, which is at once lifted and discharged. The hole can be excavated of a uniform width and depth, and no more than is needed to receive the post comfortably with firm ground around it.

This new digger is supplied by the Cycle Woven Wire Company, Melbourne.

TESTING SEEDS FOR GERMINATION.

(J. J. SHORNER, ARIZONA EXPERIMENT STATION).

For the ordinary planter, the well-known "dinner plate" tester, made with two soup or dinner plates, and one or more moist strips of sterilised cotton goods, preferably cotton flannel, will be found to answer all purposes. When, however, it is desirable to make several germination tests at one time, or when many varieties are to be tested, instead of duplicating the plate germinators as already described, the writer found the following germinator, suggested by Dr. Volney Spaulding, formerly of the University of Michigan, to be superior:—

A deep granite bread-pan, six or eight inches wide was obtained, in which was kept about $\frac{1}{4}$ in. of water: cotton flannel strips, of any convenient length, two or three yards, and of the width of the pan, were tucked crosswise at intervals of five inches: short galvanised wires about an inch longer than the width of the pan were inserted through these tucks and gathered together, thus forming the cotton strips into numerous folds or loops, which were suspended in the pan above the water by means of the supporting wires. The ends of the strips being left sufficiently long to touch the water in the pan, the entire piece of cloth composing the loops, in which the seeds were placed, is kept uniformly moist. The cloth should be moistened before beginning the experiment. A definite number of seeds are taken as they come from the average sample, or counted out for each germination test. For seeds in rather small lots, as garden seeds, 50 to 100 will answer, while for cereals, grasses, clovers, and others used in extensive cultural operations, about 200 should be used, and the tests duplicated when any doubt exists about the results. The tests should be examined from day to day, and the sprouted ones removed and counted, the number being recorded on a sheet of paper. The length of time required for germination is dependent upon several factors, chief of which are moisture, temperature, vitality, and varietal differences, six to ten days being sufficient for most kinds. When tests are made during the winter or early spring months, at which time it is usually most convenient, the germination should be conducted in a moderately warm room, so that the temperature will not fall below 50 degrees at night, and remain between 70 and 80 degrees during the day. In the case of alfalfa and certain others of the clover family, a small percentage of the seeds will remain apparently sound at the close of the germination test. Allowance is usually made for these, one-third being counted as viable, *i.e.*, capable of growth.

MILK FLOUR.

A New Product Rapidly Coming into Use.

—.

(Nebraska Experiment Station).—Milk flour and dried milk are commodities which, along with other materials of their kind, have recently been placed upon the dairy market. These substances are made from whole milk and are simply the residue from milk after the water has been driven off. Condensed milk has long been known as a standard article in trade and has answered a very good purpose, but powdered milk has an advantage over the condensed article. It can be exposed to the air for an indefinite period and still retain its unfermented sweetness without the addition of any preservative or like substance.

Milk, in its normal state, is made up largely of water. In every eight pounds of milk there are, approximately, seven pounds of water, the remaining one pound being solid matter, nearly all of which is digestible and nutritious. This reduction in bulk permits of the use of milk in places far remote from the source of origin, and the freedom of the powder from contamination will make its usefulness felt where whole milk cannot be procured fresh from the dairy each day. Bacteria cannot live where there is less than 12 per cent. moisture. As milk flour contains 4 per cent. moisture it is entirely exempt from bacterial fermentation and will remain sweet until water is again added.

The reduction of sweet milk to a more condensed form has been attempted for centuries, but not until the last few years has a successful process been obtained for freeing the water without injuring the solids. Several factors enter into this problem, which makes the operation an extremely delicate task. For instance, a high temperature is to be guarded against, because it coagulates the milk albumen, caramelizes the sugar and completely destroys the individuality of the fat globules. A burned flavour is distasteful in milk, and is, of course, more intensified in the dry solids. Also the subjection of milk to intense heat for any length of time makes it less digestible than the original raw product. So the simple evaporation system is unsatisfactory on account of the high temperature necessary, together with the number of hours required. Manufacturers find it advantageous to use fresh milk because it produces the sweetest, cleanest flavour, and the milk must be treated immediately to do away with rapid-forming ferments.

To manufacture dried milk it is only necessary to remove 87 per cent. water from absolutely fresh milk in an extremely short time. The method by which these results are obtained is very simple. Without previous treatment the milk is suspended directly between two hollow steel rollers. These rollers fit snugly together, causing the milk to pass between them in a very thin sheet.

Heat is obtained by driving steam, of sixty pounds pressure, into the slowly revolving rollers, thus drying the milk as it clings to the outer surface.

A knife edge at the outside removes the milk, like shavings from a joiner's plane. This entire operation has not taken longer than ten or fifteen seconds. The shavings are now put into low temperature ovens and dried to a perfect crispness. Later, they are ground to powder in a simple mill. The solids take on the appearance of flour, except for the slight yellow colour which naturally characterises milk. In this form, the milk, its chemical composition unchanged, is packed in barrels or boxes ready for the market.

Bakers and confectioners find dried milk an excellent article in their kitchens. It can be incorporated evenly into their pastries and candies without an excess of annoying liquid ; it is always at hand, there is no waste ; and the resultant dainties can always be made pure and uniform. The bulky cans of milk, left exposed to age and spoil, with the consequent large number of milk utensils, are done away with, while in their stead is an imperishable article stored in a package that can be thrown away when empty. The Navy and steamship companies rapidly contract large quantities of this article and at the present time are the largest users. Owing to the large demand for cooking purposes, very little dried milk is converted back to its original state by readdition of water, but the writer has tasted milk made by adding eight parts of water to one of the powder, that was similar in every way to fresh milk.

TRADE WITH JAVA.

Messrs. K. A. R. Bosscha, Head Manager of the Malabar Tea Estate ; J. Huide Kopen, Manager of the Nederland-India Lumber Company ; B. Streefland, Trade Commissioner of the Dutch Government of Java, and C. Koning, Director of the Royal Dutch Packet Company, who have made a tour of inquiry through the Commonwealth into the possibilities of increasing the commercial relations between the Dutch East Indian Colonies and Australia, spent a few days in Perth during the end of November on their return voyage.

Many attentions were paid to the visitors and opportunities afforded them of gaining an insight into the industrial and trade conditions of Western Australia. The impressions created in the minds of the delegates were very clearly expressed by Mr. Streefland in an interview with a Press representative.

Java and this State.

"When we had completed our tour and our investigations in the Eastern parts of Australia I felt," said Mr. Streefland, "that our mission was about ended. I had no idea that we would find anything here worth bothering

about, and thought that we would just spend a few days in order to complete our tour of the Commonwealth. I have, however, been absolutely astonished with what I have seen and learned. I am convinced that this is very nearly the best State of the lot, and particularly so in so far as trade with Java is concerned. The proximity of the two countries is a big factor which will tell in the trade relations which I have every confidence will shortly be opened up between Java and Western Australia. I have had several interviews with your Premier, who was most kind and took special pains to see that we were afforded all the information possible. The Minister for Agriculture also was very good to us, and to them we are very thankful. There is not any doubt in my mind that we can open up a big trade, but the first consideration will be the shipping facilities. At present the freight charges are almost prohibitive. They are greater between Java and Fremantle than they are between Java and Melbourne. This position is brought about by reason of the fact that the Royal Dutch Packet Co. already has a line of steamers running to the Eastern States, *via* Torres Straits, with Melbourne as the terminal port.

Direct Steamship Service.

I am hopeful that Mr. Koning will see his way clear to open up a new line to Fremantle. This, of course, will be a big undertaking for his company, for there will naturally be a loss on the business for two or three years. However, the prospects of our reciprocal trade are so promising that the step contemplated will, to my mind, be thoroughly justified in the long run. If this new line is opened up goods will be carried from Fremantle to Java within seven days, and this consideration will be a big one so far as your fruit export trade is concerned. We get a good deal of fruit from Sydney at present, but we do not receive it in that fresh condition which would be possible were your growers able to place their products on our markets within a week or ten days from the time of packing. All of the Dutch steamers are fitted with cold storage chambers, and this advantage is at present denied those of your exporters of fruit who are desirous of exploiting our markets. They have not any cold storage accommodation on the steamers which ply between our country and yours, and in addition they take 14 days to complete the journey.

Fruit Exports.

"While we are in a position to take your fruits as well as your other products we are also in a position to supply your markets with, among other things, tropical fruits. Most of these you now obtain from Queensland, and they take a month to get here. Take bananas, for instance. We can give you better fruit than you get from Queensland, and because of our closer proximity, we can let you have it in much fresher condition and at a cheaper rate. Of course, in speaking of fruit, I am merely referring to only one of the many kinds of your products which will find a ready market in Java. I am convinced that Western Australia will be able to supply us with many commodities that we require, and that your State will afford us a very suitable market for many of those products which we desire to export. I feel sure that as a result of our visit a big trade will be opened up—a trade of greater magnitude than any of us have hitherto imagined was possible. When

I go back I will report in this way to the Governor-General, and will tell our people of the wonderful things we have seen and the information we have gained.

Immigration to Australia.

"Next year I go to Holland for the purpose of reporting upon the possibilities of Australia as a land of promise for those of our countrymen who desire to settle in new countries. I will deliver a series of lectures and with the aid of publications and information kindly afforded me in all of the Australian States, I feel that I will be able to show our people that Australia is the one country in the world to which people should emigrate. We have settlers of the most desirable class, and any country will find them worthy of a warm welcome. Just at present the majority of our people who go abroad sail for America, but that is because they are quite ignorant of the great advantages there are for them in this wonderful land of yours. Dr. Arthur has had articles published in the Dutch papers, and I am going to further his efforts by also publishing articles and delivering lectures.

"On the eve of my departure from Australia," concluded Mr. Streeland, "I desire to ask the favour that you will give expression to the fact that my colleagues and myself are deeply grateful to all we have met in Australia for the exceptional kindness shown us. Everywhere we have been treated with wonderful consideration, and the efforts put forth to have us supplied with all possible information has made our tour doubly enjoyable and profitable. As the representative of the Dutch Government I will be back in Australia next year in furtherance of the efforts which are being made to develop the trade relations between the Commonwealth and the Dutch Settlements."

PUBLICATIONS RECEIVED.

Annual Report (1907), and Bulletins, Department of Agriculture, San Paulo, Brazil.

Dry-land Agriculture—United States Department of Agriculture.

Annual Report, Department of Agriculture and Stock, Queensland.

Agricultural Ledger (India).

Bulletins, National Agricultural Society, Rio.

Dry Rot of Potatoes (Department of Agriculture, U.S.A.).

Bacterial Disease of Tomatoes, Egg-plant, and Potato (Department of Agriculture, U.S.A.).

New Zealand Year Book, 1908.

LUMPY JAW IN CATTLE.

ACTINOMYCOSIS.

(From the Journal of the Board of Agriculture of Great Britain, August, 1908.)

This disease is met with in most parts of Great Britain, under such local names as wooden tongue, wens, lumpy jaw, big head, etc. In this country, cattle are principally attacked, but it may also occur in pigs, sheep, horses and man.

Actinomycosis runs a chronic course, and is characterised by the formation of tumours in various parts of the animal body. These tumours interfere with the functions of the organs in which they are situated, and ultimately burst or ulcerate. If untreated the animal steadily wastes, especially if the tongue is affected, and it eventually dies.

Cause.—The disease is caused by the entrance into the animal and the propagation in its tissues of the actinomyces. This is a fungus which grows on grasses and most cereals, particularly on barley. It flourishes luxuriantly on damp, rich soils. Injuries to the skin and to the mucous membranes of the mouth and tongue, caused by hard straws or barley awns, as well as the teething troubles of young animals, predispose cattle to the disease, by favouring the entrance of the actinomyces to the tissues.

Symptoms.—The disease is usually local—that is, it is confined to one organ of the body and the symptoms are largely determined by the part attacked. Nodules of varying sizes often form on the skin of the head and neck; at times these are firm to the touch while sometimes the skin is broken and the nodules are granular, soft, yellowish in colour, and covered by a crust. The skin covering the lips, being very liable to injury, is frequently attacked. The lips then become hard, and enlarged to such an extent that food is gathered with difficulty. The tongue, however, is the commonest seat of the disease. The presence of the actinomyces in this organ excites a growth of fibrous tissues causing the tongue to become hard and immobile, hence the name “wooden tongue.” This gives rise to a constant dribbling of saliva and quidding of the food, which causes the mouth to be examined. The hardness and painfulness of the tongue, and the presence of ulcers at its base, renders this form of the disease easy of diagnosis.

At times tumours can be felt under the skins in the muscles of the cheeks. Both jaw bones, but usually the lower one, may be invaded by the actinomyces from the soft tissues of the mouth, and possibly through the sockets of the teeth. Great swelling of the attacked bone is noticed, and the head sometimes swells to a great size. Pus collects in cavities in the bone, eventually breaking through the skin, and forms wounds which constantly

discharge. In this condition the jaw is easily fractured, and the teeth drop out. A very common form is met with when the glands of the neck are affected ; a swelling or "wen" appears between the angles of the jaw, which steadily increases in size until breathing and swallowing are interfered with. These tumours often burst, and discharge a characteristic, granular, yellow pus.

The presence of tumours (polypi) attached to the mucous membrane of the mouth and the back of the throat can often be recognised by the snorting grunt which accompanies breathing, and by the difficulty in swallowing.

Actinomycosis also occurs in the udder, and in the spermatie cord of castrated animals, giving rise to fibrous enlargements of the said organs.

Treatment.—In districts where the actinomyces flourishes it is almost impossible to prevent animals being attacked. Drainage of land is said to have diminished the number of cases by checking the growth of the fungus. If barley straw must be fed to stock, it should not be fed to young animals when changing their teeth as the actinomyces has an excellent chance of entering the tissues through the gums. Although prevention is difficult, the disease responds to treatment. Whenever possible, the actinomycotic tumours should be removed by a veterinary surgeon. When in an inseparable position, medicinal treatment will generally check or cure the disease. Treatment should not be attempted by a layman as the tumours have usually to be removed from the region of the head and throat, which only a skilled surgeon may attempt, while the success of the medicinal treatment depends on giving the specific drug (iodide of potassium) until symptoms of poisoning by this drug appear, when its administration must immediately be stopped.

EDITORIAL REQUEST.

Correspondence and Queries are invited from subscribers and readers of the Journal on any subject of interest to agriculturists and other settlers on the land, either conveying useful information or seeking it. Suitable letters and contributions will be published and answers to queries given in the succeeding issue, if communications are received by the Editor not later than the fifteenth of each month.

Secretaries of Agricultural Associations, Societies, and Farmers' Clubs are kindly requested to supply corrections of the lists published in the Journal, such as changes of appointments, dates of shows and meetings, as well as any other items of interest.

PARASITE FOR CATTLE TICK.

Mr. George Compere, Entomologist of the Department of Agriculture, forwards the following report on the Cattle Tick Parasite, dated Hong Kong, October 7th :—

"Yours of September 12th, 1908, with reference to the cattle tick parasite, reached me this morning. I am more than pleased to learn that there has at last been recorded a parasite upon cattle tick, as it bears out my contention that the cattle tick would be found to have its natural enemy the same as other insects have. If the matter is once properly looked into, I have no hesitation in saying that there will be numerous species of parasites discovered upon cattle tick. Mexico is the country which, I think, is most likely to furnish us with the true cattle tick parasite. I shall be only too pleased to investigate the matter fully, and shall suggest to Mr. Jeffry (Deputy Commissioner of Horticulture, California), in my next letter, that when I have worked out this field, I be sent to Texas and Mexico. The transplanting of the cattle tick from Texas or Mexico to Western Australia is going to be a little expensive, as it will have to be accomplished by bringing them over on tick-infested stock. The parasites will naturally be very minute and difficult to keep alive in cold storage for 50 to 60 days, as would be required. I expect to see you before I visit the American States again, and I am going to bring along from here more parasites upon red scales. I have also discovered the potato moth here in potatoes in the public market, but up to the present I have been unable to learn from what district the infested potatoes came, but I shall keep up the search. The potato moth is either of recent introduction, or it has an effectual parasite here, as up to the present I have only seen the moth in two lots of potatoes. I have now a small stock of red scale, from which I shall be able to stock some plants with. It was only to-day that I located it"

GOVERNMENT LABOUR BUREAU.

OPERATIONS DURING NOVEMBER.

Mr. James Longmore (Superintendent of the Government Labour Bureau) reports as follows on the operations of the Labour Bureau for November :—

Perth.

Registrations.—The total number of men who called during the month in search of work was 877. Of this number 508 were new registrations and 369 renewals, i.e., men who called who had their names registered during the months of July, August, September, and October. The trades or occupations of the 877 applicants were :—Labourers, 321 ; handymen, 82 ; farm

hands, 62; handy lads, 55; cooks, 36; carpenters, 29; miners, 21; gardeners, 20; bushmen, 19; clerks, 13; grooms, 12; bakers, 11; engine-drivers, 10; horse-drivers, 10; painters, 9; blacksmiths, 8; bricklayers, 8; hotel hands, 8; strikers, 7; butchers, fitters, ironmoulders, pipe-moulders, station hands, 6 of each; caretakers, dairymen, orderlies, plumbers, printers, yardmen, 4 of each; boilermakers, carpenters (rough), engineers, kitchenmen, shearers, mechanics, orchardists, plasterers, survey hands, sawmill hands, waiters, 3 of each; brickmakers, hairdressers, iron merchants, machinists, packers, shop assistants, storemen, shoeing smiths, stockmen, teamsters, wiremen, 2 of each; and 25 miscellaneous.

Engagements.—The engagements for the month totalled 353. The classification was :—Labourers, 107; farm hands, 70; bushmen, 32; handy men, 27; sawmill hands, 15; miners, 12; handy lads, 10; cooks, 9; fencers, 9; lads for farms, 7; carpenters, 6; platelayers, 4; groom-gardeners, gardeners, hotel hands, painters, survey hands, 3 of each; canvassers, orchardists, shepherds, yardmen, 2 of each; and 22 miscellaneous.

Kalgoorlie.

Registrations.—The registrations were 32 and the renewals 22; total, 54. The classification was :—Handy men, 20; labourers, 13; handy youths, 4; miners, 4; carpenters, 3; engine-drivers, 2; blacksmiths, 2; and 6 miscellaneous.

Engagements.—There were seven engagements, viz., miners, 4, 1 each engine-drivers, handy men, and labourers. The female servants who called numbered 19. There were eight new registrations and eleven renewals. The classification was as follows :—Waitresses, 5; housemaids, 4; housekeepers, 3; charwomen, 2; cooks, 2; and 1 each generals, laundresses, and useful girls. There were no engagements.

GENERAL REMARKS.

Perth.

The number of individual men who called at the central office, Perth, during the month in search of work was 877. The engagements for the month were 353, which includes those whose fares were advanced to proceed to districts where there was a good prospect of finding work. Appended is a table showing the number of applicants for work, as also engagements for the four previous months :—

					Applications for Work.	Engage- ments.
July	..	..	..	..	918	272
August	..	..	..	..	855	269
September	..	..	..	..	833	273
October	..	..	..	..	715	210

During the month there were 220 men assisted by railway passes from the central office, Perth, at a cost of £189 7s. 7d. The fares refunded totalled £47 2s. 3d., and the sum of £11 12s. 9d. was received from employers to send workers, the whole amounting to £58 15s.

MARKET REPORTS.

GENERAL SUMMARY.

FARM PRODUCE.

Since last summarised report, there has been a downward tendency in the chaff markets. Supplies coming forward have been meagre or only in moderate quantity and the quality not of the highest grade. Sales lacked animation and dragged somewhat. Prices show an easing off, but to the advantage of sellers of low grade parcels. Quotations ranged as follows :— Good prime wheaten, up to £4 12s. 6d., but with little obtaining; good medium, £4 2s. 6d. to £4 5s. ; lower quality, to £3 17s. 6d.

In the grain market, Wheat and oats have ruled quiet. Wheat about 3s. 7d. to 4s. ; oats, 2s. 2d. ; barley, quiet, 2s. 10d.

LIVE STOCK.

Good business has been done in live stock, and some heavy yardings experienced. Brisk bidding ruled at sales and high prices for good stock were realised. Demand for young stock continues good.

Horses.—Draughts sold up to £45; mediums, £35 to £40; lighter, £18 to £25 ; hacks and trap horses, from £10 to £20.

Cattle.—Bullocks for beef, £5 15s. to £7 ; cows, with calves, £9 to £11, and £4 to £6; heifers, £3 15s.

Sheep.—Prime fats, 16s.; wethers, 10s. 6d. to 13s.; ewes, 13s. to 16s.; lambs, 7s.

Pigs.—Fine porkers, 35s. each ; light, 17s. to 28s ; vealers, 45s.

LONDON PRODUCE MARKETS.

Messrs. W. Wedell & Co., under date London, November 6th, report as follows :—

Wool.—Markets at home have been quiet since the close of the recent London auctions, though the tone remains steady. Prices for immediate delivery are firm, and sellers are demanding the utmost farthing, and are quite opposed to any concession. For future delivery, however, it is quite possible to pick up lots at slightly under current quotations. Merinos are being more enquired for than crossbreds, and are, of the two, the easier to sell.

For the six series of sales which commence on the 24th November, the following quantities have arrived to date, viz. :—83,000 bales, of which 19,000 bales are from New Zealand, 60,000 from Australia, and the balance from South Africa.

Grain.—Wheat, etc.—All markets have shown more strength during the past fortnight, and values may be quoted 9d. to 1s. per qr. higher than at the date of our last report. The unsettled political situation on the Continent has certainly had a steadying influence on the market, but the chief factor in raising values has been the reports coming from the Argentine regarding the serious damage to crops in that country. The demand, however, has been more of a speculative nature than genuine buying by millers. There is, no doubt, that to a very large extent the price of wheat will depend upon the Argentine crops for this year, as supplies from India and Russia are not likely to be heavy. Shipments have continued on a pretty large scale, although about 250,000 quarters less than a fortnight ago. At the close, the market here is steady but quiet, and movements to a large extent will depend upon crop news from the Plate, and we do not look for any material alteration in values unless the crops there ultimately prove to be seriously damaged. Latest reports indicate that the extent of the damage has been very much exaggerated.

For wheat on the spot there has been a very poor demand, to some extent owing to the unremunerative state of the flour market, and also to the large supply of cheap potatoes.

English Wheat.—There has been a fair demand in most of the country markets, but farmers seem less anxious to sell. For good reds 32s. to 33s. 6d. per 504lbs., delivered to millers, is being paid. The average price last week of 30s. 8d. per imperial quarter marks a decline of 6d. per quarter from the previous fortnight, and is 5s. 7d. per quarter lower than at the same time last year.

Australian Wheat.—Ex Store.—There is nothing fresh to report, values remaining unchanged with a slow demand. We quote :—40s. to 41s. per 496lbs.

Frozen Meat.—Sales of frozen meat have been slow and difficult. The retail trade is not good, and, even at the low prices at which the heavy supplies of fresh killed mutton and lamb are offered at Smithfield, difficulty is experienced in effecting clearances day by day. There is at present nothing to choose between the London market and the Provincial centres as regards dulness of trade. Frozen beef is fairly firm in price, but the demand is not good, as chilled beef is now cheaper. Australian mutton, good light weight sheep at 3 3/8d., medium and heavy weights, at 3 3/16d. and 3 1/4d.

GARDEN NOTES FOR JANUARY.

At this time of the year the work of the garden is at a disadvantage. All plants no longer of value or going to seed should be pulled up, as well as weeds and destroyed. Land gone out of use can be dug up to lie fallow until autumn. Cut worms are likely to be troublesome and should be kept in check by continual stirring of the soil and liming with caustic lime. Spraying with Paris Green is the most effective remedy. Care should be taken to save tomatoes from black rot by staking and use of Bordeaux mixture. Remove all fruits showing signs of disease.

Beans.—Summer-growing beans may be sown where there is sufficient moisture. Lima and Madagascar beans will do well.

Silver Beet.—This is a thriving summer vegetable, valuable for the table and farm stock. Though late in the season, it can be sown in favourable localities.

Cabbages.—Cultivate growing plants and apply a little liquid manure where necessary.

Celery.—Earth up forward plants.

Cucumbers.—In moist places, seed can be still sown in well worked holes and where there is shade for young plants.

Maize.—Cultivate between the rows and hill up the earth towards the plants. Pick cobs before they become hard for table use.

Melons.—Now fit for market. Select and mark those intended for seed.

Onions.—Main crop should be ready for market. A little seed can be sown for garden purposes, if water is available.

Pumpkins and Squashes.—The cultivator can be kept at work between the rows. Supplies of ripe, early varieties should be now available.

Tomatoes.—A few more young plants can be set out where shade and water can be obtained.

THE FARM AND GARDEN.

Harvesting operations will be almost at an end. Hay stacks should be thatched and protected from storms and bush fires. Straw for winter use will be the better for good stacking. Machinery before being laid up should be thoroughly overhauled, cleaned, and oiled.

Mustard Rape can be sown in light sandy soils.

The Garden.—Balsam, begonias, calceolaria, cyclamen, cineraria, gloxina, and primula, can be sown.

Rainfall for the month of November, 1908, recorded at telegraphic stations in Western Australia, and averages.

STATIONS.	Total for November, 1908, in points. 100 points=in.	No. of wet days.	Average for November.	STATIONS.	Total for November, 1908, in points. 100 points=in.	No. of wet days.	Average for November.
TROPICS :				NORTH COOLGARDIE			
Wyndham ...	44	8	238	FIELDS :			
Turkey Creek ...	129	8	176	Sandstone ...	55	4	...
Hall's Creek ...	90	6	118	Wiluna ...	Nil	...	12
Fitzroy Crossing ...	67	2	47	Mt. Sir Samuel ...	Nil	...	13
Derby ...	9	1	97	Lawlers ...	9	2	32
Broome ...	6	1	24	Mt. Leonora ...	5	1	34
La Grange Bay ...	13	1	24	Mt. Malcolm ...	4	1	33
Wallal ...	Nil	...	9	Mt. Morgans ...	53	3	39
Condon ...	Nil	...	11	Laverton ...	57	4	53
Bamboo Creek ...	18	1	68	Murrin Murrin ...	20	2	27
Marble Bar ...	5	2	42	Yundamindera ...	43	1	29
Warrawoona ...	Nil	...	15	Kookynie ...	35	2	29
Nullagine ...	Nil	...	50	Niagara ...	26	2	33
Port Hedland ...	18	1	1	Menzies ...	28	3	32
Whim Creek ...	Nil	...	3	Mulline ...	45	3	31
Roebourne ...	Nil	...	10				
Cossack ...	Nil	...	6	COOLGARDIE GOLD-			
Fortescue ...	Nil	...	1	FIELDS :			
Onslow ...	Nil	...	2	Davyhurst ...	52	3	24
Winning Pool ...	Nil	...	3	Goongarrie ...	31	3	29
WEST COASTAL :				Broad Arrow ...	40	5	80
Carnarvon ...	Nil	...	5	Kurnalpi ...	30	2	47
Sharks Bay ...	Nil	...	4	Kanowna ...	11	2	40
Wooramel ...	Nil	...	3	Bulong ...	20	2	44
Hamelin Pool ...	1	1	11	Kalgoorlie ...	38	4	39
Northampton ...	105	3	27	Coolgardie ...	39	4	54
Mullewa ...	26	3	26	Burbanks ...	37	2	119
Geraldton ...	78	4	25	Widgemooltha ...	37	4	60
Greenough ...	85	3	20	Norseman ...	44	2	61
Dongarra ...	65	1	24	Boorabbin ...	47	2	70
Minginew ...	69	2	33	Southern Cross ...	88	5	45
Carnamah ...	53	3	41				
Dandarragan ...	57	4	46	S.W. COASTAL :			
Moora ...	69	4	31	Kalamunda ...	142	9	...
Walebing ...	101	4	48	Gingin ...	83	4	50
New Norcia ...	114	7	48	Guildford ...	115	7	72
MURCHISON FIELDS :				Perth Gardens ...	86	11	78
Peak Hill ...	34	4	16	„ Observatory	107	11	63
Abbotts ...	14	2	11	Fremantle Signal	75	10	61
Gabanintha ...	33	3	7	Station			
Nannine ...	45	4	7	Fremantle Oval ...	63	5	...
Cue ...	14	2	6	Rottneat ...	40	7	67
Day Dawn ...	3	1	4	Rockingham ...	83	5	43
Lake Austin ...	14	2	11	Jarrahdale ...	222	9	104
Lennonville ...	47	3	8	Mandurah ...	153	8	58
Mt. Magnet ...	28	2	9	Pinjarrah ...	275	11	89
Yalgoo ...	24	1	9	Collie ...	256	12	75
Murgoo ...	Nil	...	5	Bunbury ...	160	11	110

RAINFALL—continued.

STATIONS.	Total for November, 1:03, in points. 100 points = 1 in.	No. of wet days.	Average for November.	STATIONS.	Total for November, 1:03, in points. 100 points = 1 in.	No. of wet days.	Average for November.
S.W. COASTAL—con- tinued.				S.W. INLAND—con- tinued.			
Donnybrook ...	152	14	83	Arthur ...	68	5	40
Busselton ...	274	15	80	Wagin ...	26	3	31
Cape Naturaliste	191	13	...	Katanning ...	133	5	47
Karridale ...	125	11	159	Broomehill ...	50	6	55
Cape Leeuwin ...	134	14	110	Kojonup ...	88	4	88
				Greenbushes ...	169	13	107
S.W. INLAND:				Bridgetown ...	119	11	113
Kellerberrin ...	107	3	33				
Meckering ...	133	5	30	SOUTH COASTAL:			
Newcastle ...	81	6	49	Mt. Barker ...	128	5	126
Northam ...	77	3	33	Albany ...	223	11	124
York ...	58	4	45	Breakesea ...	146	12	97
Beverley ...	62	5	41	Bremer Bay ...	69	6	94
Brookton ...	48	4	...	Hopetoun ...	124	5	136
Wandering ...	53	8	64	Ravensthorpe ...	103	7	100
Pingelly ...	36	4	40	Esperance ...	176	6	99
Narrogin ...	25	7	46	Israelite Bay ...	62	9	58
Marradong ...	89	9	57	Balladonia ...	37	2	49
Williams ...	47	11	84	Eyre ...	67	2	65

REMARKS ON THE RAINFALL FOR NOVEMBER, 1908.

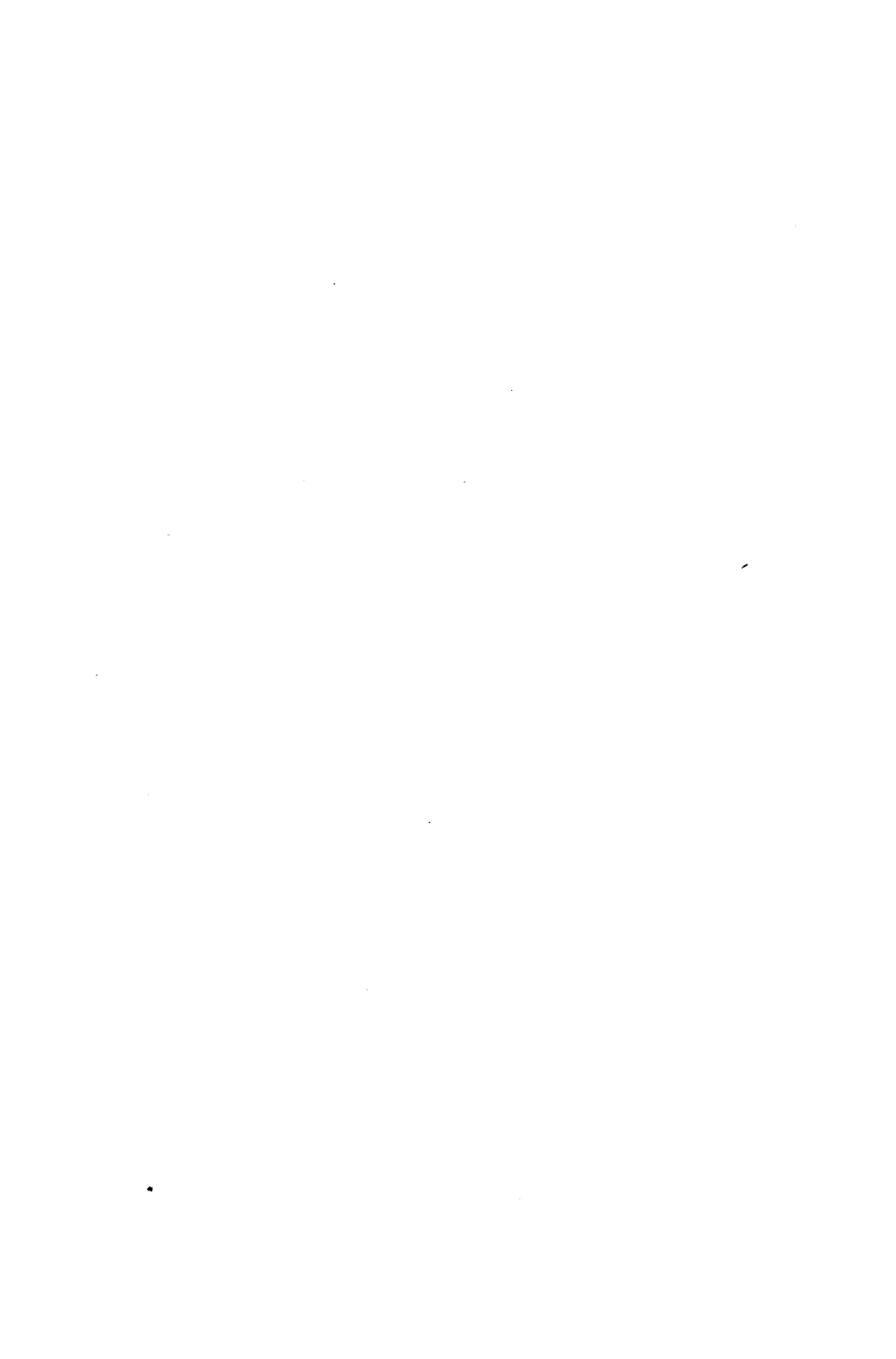
The rainfall has been above the average throughout the S.W. and S., with the exception of the districts lying between Pingelly and Broomehill, excluding Arthur River and Katanning. The excess is most marked at inland coastal stations between Jarrahdale and Pinjarrah, as well as Busselton.

The average has also been exceeded in the Murchison and portions of the Coolgardie Goldfields, elsewhere the rainfall has been below the average excepting Port Hedland in the N.W. division and Fitzroy Crossing in the West Kimberley.

E. B. CURLEWIS,

Divisional Officer for West Australia.

30th November, 1908.



I. A. R. I. 75.

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